DOCUMENT RESUME

ED 031 852 40 EC 004 217

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A Comparative Study of the Most Creative and Least Creative Student in Grades 4 - 8 at the Boston School for the Deaf, Randolph, Massachusetts.

Boston Coll., Chestnut Hill, Mass.

Spons Agency-Office of Education (DHEW), Washington, D.C. Bureau of Education for the Handicapped.

Bureau No-BR-6-8771

Pub Date 68

Grant-OEG-1-7-008-771-0480

Note-153p.

EDRS Price MF-$0.75 HC-$7.75

Descriptors-Academic Achievement, Age Differences, *Aurally Handicapped, Career Choice, *Cognitive Processes, *Creativity, Deaf, *Exceptional Child Research, Family Relationship, Imagination, Intelligence Differences, Self Concept, Sex Differences, Student Evaluation, Teacher Attitudes, Testing

To investigate the interrelationships between creativity and seven variables, 74 students in grades 4 through 8 plus the vocational group at a school for the deaf were tested. In addition to creativity, subjects were tested for intelligence, academic achievement, imaginative productions, perception by teachers, self-evaluation career aspirations, and as members of a family group. Indications were as follows: intelligence test scores did not differentiate between the most and least creative except in boys under 14; verbal achievement scores did not differentiate between creativity groups but there were significant differences in numerical achievement; teachers preferred low creative girls over low creative boys and preferred high creative boys under 14 to low creative ones; scores on a verbal thinking speed test did not differentiate between creativity groups but those under 14 attained higher scores than the over-14 group. Additional findings were that a drawing test did not differentiate, that the two creativity groups could not be distinguished according to socially accepted responses on the verbal thinking test, and that the high and low creativity groups could not be differentiated as members of a family group. (RJ)

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A COMPARATIVE STUDY OF THE MOST CREATIVE AND LEAST CREATIVE STUDENT IN GRADES 4-8 AT THE BOSTON SCHOOL FOR THE DEAF, RANDOLPH, MASSACHUSETTS

Grant No. OEG-1-7-008 771-0480

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1968

The project reported herein was supported by The U.S. Department of Health, Education and Welfare Office of Education, Division of Handicapped Children and Youth

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Chapter 1

Introduction

Authorities in the field of education of the deaf state that, education of the deaf throughout the world is inadequate; the deaf population is not achieving academic or vocational success proportionate to its potential; and society is not fulfilling its responsibility to aid in the personal development of its deaf. In the United States, the Advisory Committee on the Education of the Deaf (1965) reports:

> The American people have no reason to be satisfied with their limited success in educating deaf children and preparing them for full participation in our society.
>
> 1. Less than half of the deaf children needing specialized pre-school instruction are receiving it.
> 2. The average graduate of a public residential school for the deaf, (the closest we have to high schools for the deaf), has an eighth grade education.
> 3. Seniors at Gallaudet College, the nation's only college for the deaf, rank close to the bottom in performance on the Graduate Record Examination.
> 4. Five-sixths of our deaf adults work in manual jobs, as contrasted to *only one-half* of our hearing population /p. xv/.

This situation is not limited to the United States, however. In France, Oleron (1953) states that the educational failure of deaf children is the fault of the educators. In a survey of twenty-one countries of Western Europe, Taylor and Taylor (1962) indicates that there is a need for expanded programs for children with hearing deficiencies in every country. Very few deaf students reach the secondary or university level in any of the countries surveyed.

Thus, it is widely agreed that the deaf are failing to develop their potential at a time when the Federal Advisory Committee (1965) states that the technical, economic and educational demands of our society require higher levels of achievement from all our children.

In the United States, investigators have sought to provide answers to these problems by studying educational methods employed by the deaf and the schools for the deaf. The "methods controversy" has focused on communication: centered about the issue of whether the deaf should learn to communicate through the oral method (speech and lipreading) or the manual method (finger spelling). According to the Advisory Committee, most educators agree that a combination of these methods is the best approach.

Because of the concentration in the area of communication problems, and educational methods, there has been comparatively little research in other areas. Investigators are just beginning to study the total child, including the physiological, environmental, psychological, and sociological factors involved in hearing problems.

Perhaps, the "bold new approach" of John F. Kennedy, as discussed by Smith (1966) regarding community mental health may provide a broader theoretical basis to the education of children who are deaf. This approach involves personality theory and social psychology, viewing the "self" in a total environment in relation to the community and the world. Thus, the education of a deaf child would involve the utilization and coordination of all available information from the physician, audiologist, psychologist, sociologist, and teacher in reference to the individual child. Answers to questions concerning how these individuals best develop their potential would be provided by viewing the field of education as a whole and education of the deaf would be seen in perspective as a part of the entire field. Thus, current educational theory would not be divorced but be related to children with specific disabilities.

Statement of the Problem and Purpose of the Study

It is almost impossible not to be aware of the preponderance of literature concerning creativity since Guilford's address (1950) to the American Psychological Association. The ever increasing interest by educators is apparent. If investigators are recognizing the need for research in this field relevant to the study of children in general, and the educational implications of such study, then all the more reason to study creativity in relation to children who are deaf, where the educational implications might have more permanent and far reaching effects.

Torrance (1963b) states that recent research findings indicate that

> Children can be taught in such a way that their

> creative thinking abilities may be useful in acquiring the traditional skills, that these abilities are different from those measured by traditional intelligence and scholastic aptitude tests, and that they are important for mental health and vocational success. Many educational leaders are seeing in these findings a demand for truly revolutionary changes in educational objectives, in curricula, and in instruments for assessing mental growth and educational achievement, instructional procedures, counseling and guidance procedures, and even in school building planning /p. 3/.

The purpose of this study, therefore, is to add to the general knowledge of creativity, which is far from adequate; to explore any relationships between the specific handicap of deafness and creativity; and, to ascertain how the creative deaf student as described in this study might differ from the description in the literature of the creative hearing student.

Getzels and Jackson (1962) and Torrance (1962) provide extensive experimental discussion in reference to creativity and hearing children. Getzels and Jackson (1962) state that their study had several educational implications in reference to achievement. They said,

> When there has been a discrepancy between IQ and achievement . . . variance may be attributed to cognitive functions sampled in the creativity battery but not included in the IQ metric /p. 28/.

In reference to higher education they said,

> When the two most common criteria applied to the prospective college student are scholastic aptitude measures of the IQ test type, and school recommendations based on teacher evaluations

> of student characteristics, it seems that the highly creative student is penalized in favor of the high IQ student /p. 32/.

Guilford (1959) stated that

> Verbal comprehension is undoubtedly a very important trait in a verbal civilization, but its obvious role has obscured the importance of other factors . . . A clearer knowledge of the other intellectual abilities should enable us to reappraise the current approaches to encouraging intellectual development through education /p. 360/.

Certainly, if Guilford suggests that there has been too great an emphasis placed on verbal comprehension in reference to hearing students, so that "other factors" have been obscured, how necessary it is to study these "other factors" in relation to students who are deaf.

This study is a partial replication with deaf subjects, of Getzels and Jackson's work with hearing subjects. The design of Getzels and Jackson's study has been criticized by DeMille and Merrifield (1962), and by Marsh (1964). Therefore, the independent and dependent variables parallel those of Getzels and Jackson (1962) but the statistical design of this study takes into consideration the criticisms of the above mentioned authors.

This study investigates the interrelationships between creativity and each of the following variables: intelligence, school performance, imaginative productions, perception by teachers, self evaluation, career aspirations, and the subjects as members of a family group, as these are evidenced by the instruments used in this study. These subjects were attending the Boston School for the Deaf in Randolph, Massachusetts. The total enrollment in grades four through eight have been included in this study.

Definition of Terms

Creativity was operationally defined as the scores on Torrance's (1963a) Abbreviated Form VII, Minnesota Tests of Creative Thinking. This battery includes: The Incomplete Figures Test, the Circles Task, the Product Improvement Task, and the Unusual Uses of Tin Cans Task.

Getzels and Jackson (1962) did not use these creativity tests. They used five others, but these were not appropriate for use with deaf subjects of this age group. However, Getzels and Jackson did attempt to measure divergent, rather than convergent thinking, including fluency, flexibility, originality and elaboration.

Scores on the subtests in the Abbreviated Form VII, Minnesota Tests of Creative Thinking include separate scores for fluency, flexibility, originality and elaboration. These scores were combined and used as a single creativity score. The tests were not machine scorable and were scored by E. Paul Torrance for greater reliability of scoring, although the Manual provides scoring instructions. (This was true when the testing was done. Now it is possible to have these tests scored by Personnel Press Scoring Service, 21 Audubon Ave., New York, N. Y.).

Intelligence was operationally defined as the score on the Wechsler Intelligence Scale for Children (WISC) for subjects in grades four and five or the Wechsler Adult Intelligence Scale (WAIS) for subjects in grades six, seven and eight, Performance Section. Wechsler (1944) defines intelligence as measured by this test as "the aggregate or global capacity of the individual to act purposefully, to think rationally and to deal effectively with his environment /p. 3/."

Getzels and Jackson (1962) used school records that were available and which included several intelligence tests. The use of the two forms of the Wechsler in this study provides comparable related measures of intelligence. (The WAIS or the WISC were reported by Vernon and Brown (1964) to be the most reliable intelligence tests for use with deaf subjects). Scoring was completed according to the Manual (Wechsler 1949) and a performance section score was recorded by the test administrator.

Verbal and Numerical achievement will be operationally defined as scores on the Stanford Achievement Tests. Getzels and Jackson (1962) used school records that were available, and therefore used scores from several achievement tests. As with the measures of intelligence previously discussed, forms of one test, rather than several different tests provide better over-all and more directly comparable measures of achievement. The Stanford Achievement Tests had been administered as a part of another study and scores were available from the School. The tests: Arithmetic Computations and Arithmetic Concepts and Application: Paragraph Meaning and Language, were used to measure Numerical and Verbal achievement to parallel Getzels and Jackson's approach.

The Stanford Achievement Tests (Kelley et al. 1964) offer a means of continuous measurement of achievement from Grade Four through Grade Nine. They were developed in 1923 and revised through the years. However, Cronbach (1960) notes that for standardized tests to have real merits, they are best adapted to fairly standardized types of education. Whether the subjects of this study and the educational program of this school fulfill this prerequisite is not known, yet this test is often used in schools for the deaf and is probably as satisfactory as any not directly derived and validated on deaf children.

The stanine scores for these tests were available in the school records.

Imaginative Productions were operationally defined by the scores on the Drawing Test that was reproduced in Getzels and Jackson (1962). The test was not machine scorable and the categories for scoring were the same as those described by Getzels and Jackson (1962).

Perception by teachers was operationally defined as the scores on the Teacher Rating described in Getzels and Jackson (1962). The ratings were furnished by the principal of the school. Another category, creativity, was added by the investigator to Getzels' and Jackson's groups.

Career aspirations were operationally defined as the scores on selected items of the G-J-G Verbal Thinking Speed Test. The scoring of these items was done manually.

Self evaluation was operationally defined as the scores on the G-J-G Verbal Thinking Speed Test and the G-J-G Test of Behavior as described in Getzels and Jackson (1962). The scoring of these tests was done manually.

The description of subjects as members of a family group was operationally defined as the scores on the Parent Questionnaire that was similar to the one used by Getzels and Jackson (1962) but changed by the principal of the school to add information desired for school records, and by the investigator, where questions might yield information applicable to subjects with hearing difficulties. Scoring was done manually.

Assumptions

The basic assumptions underlying this study were: first, an intelligence test does not represent an adequate sampling of all mental abilities and cognitive processes and tends towards evaluation of those processes that have been termed convergent rather than those processes that have been termed divergent (Getzels and Jackson 1962); second, creative abilities are possessed to some degree by all individuals and exist on continua within individuals (Guilford, 1964) (Durant, 1966); third, the instruments used in this study had an acceptable level of validity for deaf subjects.

Statement of Hypotheses

The following hypotheses are proposed:

Hypothesis 1 — There is no significant difference between the means on the WISC or WAIS (P) for students scoring high on the Abbreviated Form VII, Minnesota Tests of Creative Thinking and students scoring low on the Abbreviated Form VII, Minnesota Tests of Creative Thinking.

Hypothesis 2 — There is no significant difference between the means on the Stanford Achievement Test (Verbal: Paragraph Meaning and Language) for students scoring high on the Abbreviated Form VII, Minnesota Tests of Creative Thinking and students scoring low on the Abbreviated Form VII, Minnesota Tests of Creative Thinking.

There is no significant difference between the means on the Stanford Achievement Test (Numerical: Arithmetic Computations, and Arithmetic Concepts and Application) for students scoring high on the Abbreviated Form VII, Minnesota Tests of Creative Thinking and students scoring low on the Abbreviated Form VII, Minnesota Tests of Creative Thinking.

Hypothesis 3 There is no significant difference between the means of Teacher Ratings for students scoring high on the Abbreviated Form VII, Minnesota Tests of Creative Thinking versus students scoring low on the Abbreviated Form VII, Minnesota Tests of Creative Thinking.

Hypothesis 4 There will be no significant difference between the means on the two forms of the G-J-G Test for students scoring high on the Abbreviated Form VII, Minnesota Tests of Creative Thinking and students scoring low on the Abbreviated Form VII, Minnesota Tests of Creative Thinking.

Hypothesis 5 The frequency of responses on the two forms of the G-J-G Test classified according to
  conventional or unconventional occupations
  socially acceptable or unacceptable responses
are independent of the categories "most" or "least" creative.

Hypothesis 6 The frequency of responses on the Drawing Test classified as:
  stimulus bound - stimulus free
  humor present - humor absent
  violence present - violence absent
  building labeled - building unlabeled
  detail free - detail bound
are independent of the categories "most" or "least" creative.

Hypothesis 7 The frequency of responses on the Parent Questionnaire in reference to

education of parents
occupation of parents
parental satisfaction with child's career choice

are independent of the categories "most" or "least" creative.

Chapter 2

Related Literature

The literature concerned with creativity has been summarized by Stein and Heinze (1960), Getzels and Jackson (1962), Barron (1963), Taylor and Barron (1963), Golann (1963), Taylor (1964), Patrick (1966), Wallach and Kogan (1965), and Torrance (1966). Therefore, creativity will be viewed only in relation to the variables selected in this study and in relation deaf subjects.

Creativity

The problems concerned with the definition of creativity are discussed by Walsh (1964) and Durant (1966) who note that a consensus of definitions would be elusive if not impossible. The central areas of discussion evolve around the process and product areas (whether creativity is a process that may be described in stages, Dashiell (1931), Woodworth and Schlosberg (1954), Ghiselin (1956), Harmon (1956), Taylor (1959); or, a product, i.e., what is produced by creative behavior, as discussed by McPherson (1956) and Taylor and Barron (1963).

For the purposes of this study, Torrance's definition of creativity as expressed operationally in the Torrance Tests of Creative Thinking (1966) will be used:

> Creativity is a process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficulty; searching for solutions, making guesses,

> or formulating hypotheses about the deficiencies; testing and retesting these hypotheses and possibly modifying and retesting them; and finally communicating the results [p. 6].

This definition, according to Torrance (1966): "enables one to define the kinds of abilities, mental functioning, and personality characteristics that facilitate or inhibit the process, the kinds of persons that engage most successfully in the process, and the conditions that facilitate the process [p. 7]."

Guilford's (1964) factor analytic approach is expressed by the following quotation:

> The most obvious aspects of creative thinking appear to depend on the ability to do divergent productive thinking and to effect transfer of information. Fluency, flexibility, elaboration and redefinition are factors playing significant roles in creative thinking and in the larger context of problem solving [p. 31].

Torrance (1963a) takes this definition into consideration in his scoring procedures where he provides for separate scores of fluency, flexibility, originality and elaboration on each of the subtests of the battery.

Myklebust (1964) mentions Guilford's model classifying factors of intelligence into five types of mental operations noting that there are degrees at each level that may indicate the effects of sensory deprivation due to deafness. Myklebust (1964) states that divergent thinking appears to be affected by deafness and expresses the idea that it is difficult to conclude whether those deaf from early life are inferior in general on divergent thinking and evaluation ability, or whether deafness affects these abilities selectively only in certain respects. It is suggested that as more specialized non-verbal tests become available, research in this connection will be accomplished more readily.

Creativity and Intelligence

Madaus (1967) reviews briefly the problem of the relationship between creativity and intelligence noting the controversy that has been generated since Guilford's (1950) prediction that the relation between intelligence and creativity would be low.

Getzels and Jackson (1962) reported positive but low correlations between measures of divergent thinking and intelligence. This finding was replicated by Torrance (1962). However, Hasan and Butcher (1966) found higher correlations for Scottish children. Taylor and Holland (1962) concluded that the greater number of investigators report a positive but low correlation between the two constructs (.20 - .40) for general population and almost no correlation at the higher ability levels.

Wallach and Kogan (1965) felt that the divergent thinking tests being used were not measuring an attribute distinct from general intelligence. They developed five new divergent thinking tests. Correlating the results with measures of intelligence, they concluded that their construct of creativity possessed an internal consistency possessed by the general intelligence domain while being independent of intelligence.

Yamamoto (1964) reported low relationships between the Torrance Tests of Creative Thinking and intelligence, but later concluded that these tests do not measure a wholly independent and exclusive factor from general intelligence.

Madaus (1967) cited Thorndike (1963) and Wallach and Kogan (1965) in pointing out that the Torrance Tests of Creative Thinking have not been analyzed to determine whether the separate scores intercorrelate more strongly with one another than they do separately with intelligence measures. Madaus (1967) analyzed the scores of ninth and tenth grade students on selected tests of the Minnesota Tests of Creative Thinking and concluded that the relationships between the creativity tests and tests of intelligence were negligible. However, he emphasized the need for further research particularly in the area of longitudinal study.

Intelligence of Deaf Children

The Volta Review (1963) in a survey of the literature, summarizes the topics of research in this area under the headings: assessment, test standardization, and test selection.

Investigations in the assessment area are concerned with quantitative assessment in terms of mental level and I.Q. This area is also concerned with the qualitative aspects of cognition in terms of dynamic processes and perceptional-conceptional traits. There is considerable controversy concerned with the concept attainment of deaf and hearing subjects in problem solving situations whether the deaf have a distinctive pattern of thinking and reasoning or whether the differences between deaf and hearing subjects are attributable to "underdevelopment."

Stafford (1962) reports that deafness does affect problem solving behavior and that differences do exist in favor of hearing subjects, particularly at the higher levels of abstraction. He postulates the theory that, while the hearing are expanding their system of problem solving behavior, the deaf perhaps are developing skill in using the system that they already possess. Farrant (1962) also reports that the deaf were clearly retarded in tests of verbal comprehension and in most factors involving abstract figural reasoning. Yet, Rosenstein (1959) and Kates, Yudin and Tiffany (1962) report no significant difference between deaf and hearing subjects in the ability to perceive abstract or generalize when language is within the capacity of the deaf child. Frederick (1965) and Holmberg (1966) suggest further refinement of test instruments to measure "concrete" and "abstract" concepts. Blanton and Nunnally (1967) suggest further research in psycholinguistics with deaf subjects who use sign language. Although this study takes into consideration the controversy concerning concept formation of deaf subjects, it excludes theoretical discussion and defines intelligence operationally in reference to a selected instrument.

Levine's review (1963) of the literature concerning the measurement of the intelligence of deaf subjects notes the limited number of intelligence tests standardized on the deaf in a given country. Thus, it has been necessary to locate tests suitable for the deaf from among the multitude standardized on the hearing. There have been numerous studies of the Wechsler performance scales. Graham and Shapiro (1953) considered the WISC a rough measure of intelligence but not the best intelligence test for deaf children. Larr and Cain (1959) found the WISC a good test of nonverbal abilities with validity inferred on the basis of a high correlation with the Ontario School Ability Examination. Brill (1962) reported that the WAIS and the WISC discriminated well in terms of ultimate academic achievement. Vernon and Brown (1964) in a review of selected intelligence tests reported that the WAIS and the WISC (performance) were the most reliable intelligence tests for use with deaf subjects.

There have been no studies reported using both the Abbreviated Form VII, Minnesota Tests of Creative Thinking and the WISC or WAIS with deaf subjects and no literature relating creativity and intelligence of deaf subjects.

Creativity and Scholastic Achievement

Getzels and Jackson (1962) noted that although there was a 23 point difference in IQ scores, the achievement scores of high creative and high IQ groups both were superior to the achievement scores of the school population as a whole.

In six of Torrance's eight groups (1962) there was no significant difference on measured achievement between the high creative and high intelligence groups. In two of the elementary schools there was a significant difference in measured achievement in favor of the high intelligence group. Golann (1963) asks: "Under what conditions do highly creative pupils achieve as well as highly intelligent ones? [p. 553]." He cites Torrance's data (1962) suggesting that there is a tendency for the highly creative groups to be better on reading and language skills than on work study or arithmetic skills.

There have been several studies using the Torrance Tests of Creative Thinking that indicate high correlation between verbal measures of creativity and achievement. Bish (1964) reported significant correlations at the .001 level and Cicirelli (1965) and Yamamoto (1964) reported similar results. Perry (1966), using the Stanford Achievement Test Battery found that the relationship between creativity and achievement in the primary grades was not statistically significant $r = .10$ but in the intermediate grades it was significant $r = .47$.

Edwards and Tyler (1965) working with a sample in a non-selective American junior high school reported an $r = .08$ between the School and College Achievement Test (SCAT) and creativity. They concluded that Getzels' and Jackson's findings (1962) about the relation of creativity, intelligence, and achievement were not generalizable. Hasan (1966) in his replication of Getzels' and Jackson's study with Scottish children did not find that the "high creatives" scored higher than would be expected on tests of attainment.

To explain the varied results Barron (1963) suggested a threshold effect explaining the discrepancy in the relation of intelligence and achievement. He suggested a threshold IQ of 120 above which intelligence ceases to be relevant to achievement. Torrance (1962) previously referred to this threshold concept which he attributes to Anderson (1960) and suggested that below some critical point, estimated to be about 115 to 120, differences in IQ are the major determiners of academic achievement. Above this critical point differences in creativity may be more closely related to differences in achievement.

Torrance (1966) explains that rather than say that the studies regarding creativity and achievement are confusing, it would be fairer to say that the prediction of school achievement is a complex matter and is influenced by the nature of the measurement of achievement and the teacher-learning method. Torrance (1966) cites Bentley's study (1966) that indicates varied criteria have varied results and Hutchinson's study (1963) that indicates that under authoritarian teaching methods there was statistically significant positive correlation between mental age and achievement but in studies where there were considerable opportunities for learning in creative ways, the reverse was true. In Bowers study (1966) it was noted that creative thinking measures contribute more to prediction of achievement in reference to those with less ability than those with greater ability.

Torrance (1966) suggests further research in the area of creativity and achievement using Bowers' (1966) factor analytic approach. He suggests including measures of elaboration which appear to be achievement related and originality measures that were not developed at the time Bowers (1966) analyzed his data. Bowers (1966) stated that research indicates that there is a relation between degree of ability and use of creative thinking measures to predict achievement, and suggests that the extent of this relation should be investigated.

Achievement of Deaf Subjects

As is true of intelligence testing, there are few achievement tests that have been standardized on deaf subjects. In 1959, Deaf norms for the Metropolitan Elementary Reading Test, Test 2 were published. These norms were based on more than half of the total pupils registered in schools for the deaf.

Birch and Birch (1951) investigated the achievement of deaf subjects recommending the use of the Leiter International Performance Scale as a predictive aid in school achievement. In Birch and Birch's later study (1956), they reported a .86 correlation between the Leiter International Performance Scale and teacher rating of achievement. In 1963 they used the Stanford Achievement Tests finding a correlation of .95 with teacher rating of achievement. However, Giangreco (1966) in his study of 235 deaf students using the Stanford Achievement Tests and Metropolitan Elementary Reading Test among others found little success in predicting achievement. The Numerical areas (Arithmetic Computation and Arithmetic Reasoning) showed the highest and most consistent correlations throughout the entire sample. Low correlations appeared in tests requiring reading skill. The higher correlations appeared at the lower and higher grade levels suggesting that during the adolescent period adjustment problems might be reflected in the results, or a change in the nature of concept formation necessitated from a concrete to a more abstract nature. (This discussion is based on studies previously mentioned that concern concept formation in deaf subjects and relates to Farrant's (1962) study where he found the deaf subjects to be clearly retarded on verbal comprehension and abstract reasoning). Giangreco (1966) also found the digit symbol subtest on the WISC and WAIS to be a good predictor of reading and numerical achievement for deaf subjects.

Lavos (1966) in his study of 67 deaf subjects stated that there is a significant and substantial relation at less than the .05 probability level between each general intelligence variable and each achievement variable whether considered concurrently or predictively.

There is universal agreement that deaf subjects are retarded in educational achievement as compared with hearing subjects. The Advisory Committeds report on Education of the Deaf (1965) states that the Stanford Achievement Test is one of the few measures of the educational attainment of deaf subjects and is widely although not universally administered to the children in the schools and classes for the deaf. In the test taken by 920 students who left public schools for the deaf at the end of the 1963-64 school year at no age was the median grade average as high as the seventh grade, and of the 365 students who received academic diplomas, the median achievement level ranged from something less than seventh grade to something less than ninth grade. (The ages of these subjects ranged from 15 to 22 years). Thus, this committee concluded that the system of education of the deaf leaves a substantial gap between the attainments of deaf children and those of hearing children generally and suggests further research in this area.

Kohl (1966) quoting government statistics states that:

> Of the 1,104 students of sixteen years or more who for one reason or another left schools for the

> deaf in 1961-2, the 501 graduates had a grade level range of 3.1 to 12.8 in school achievement with a mean of 4.7 indicating that in general the deaf population is between 4 and 7 years retarded /p. 4/.

There have been no studies relating scores on the Abbreviated Form VII, Minnesota Tests of Creative Thinking and scores on the Stanford Achievement Tests or relating creativity and educational achievement of deaf subjects.

Creativity and Imagination

There are numerous studies of creativity and imagination as related to artistic talent and productions. These have been reviewed in Stein and Heinze (1960).

Getzels and Jackson (1962) viewed picture drawings as a creative process that had merit for observing possible distinctive characteristics of the subjects of their study. In reference to the drawings, they found the "high creatives" to be "stimulus free" meaning that the subjects departed from the literal representation of "Playing Tag in the School Yard." They also found that the "high creatives" showed more humor in their pictures than the "highly intelligent" group. High creatives also expressed more aggression and violence. Getzels and Jackson (1962) relate these results to cognitive theory pointing out that the high creatives tend to favor "divergent" modes of thinking rather than convergent modes of thinking as described by Guilford (1964).

Torrance in his replication of Getzels' and Jackson's study (1962) found a high degree of originality in the "high creative" drawings, humor, playfulness and indications of relative relaxation.

Hammet (1966) indicated a relationship between creativity scores and scores on the IPAT Humor Test of Personality. However, she noted that the issue is complicated by the appearance of multiple factors in the variables of creativity, humor, and intelligence for there are numerous factors of intelligence according to Guilford (1960), kinds of humor according to Cattell (1963), and little knowledge possessed regarding creativity. Therefore, she suggests that there may be kinds of creativity, humor, and intelligence, with degrees of each, related to stages or levels of maximum development of creativity, humor and intelligence.

Imagination of Deaf Subjects

This topic is included in the concrete-abstract discussions that have been referred to previously and is related to the problem of whether the system of concept formation is different for the deaf or merely "underdeveloped."

Myklebust (1964) says that the deaf child receives sensation, perceives and develops imagery, symbolization, and concepts. However, when auditory sensations are lacking or present only to a minimal degree the nature of perception, imagery, symbols and concepts is altered. The levels of symbolization and conceptualization are most affected; development of abstract behavior is limited. Presumably the individual with profound deafness from early life is highly dependent on imagery, especially visual imagery, which may be a predominant factor in the restriction imposed on his psychological development as well as in the concreteness which results. Language is a critical factor in the attainment of the higher levels of experience. When the relationship between deafness and each of these levels of experience is further clarified, new approaches to the learning and adjustment problems can be devised.

Myklebust (1964) suggests that nonverbal tests be used to study the convergent and divergent thinking of deaf subjects.

The Abbreviated Form VII, Minnesota Tests of Creative Thinking have not been used with the Drawing Test described in Getzels and Jackson in any other studies. Silver (1966) discussed creativity of deaf subjects in the light of artistic ability to produce drawings. She concluded that deafness does not necessarily retard artistic production. Previously Pintner (1941) found deaf females to be inferior to hearing females on progressive ability to make artistic judgments as measured by the McAdory Art Test. Pintner (1941) and Myklebust (1964) agree that deaf children are not inferior in the artistic judgment involving pictorial material and that sex and etiology of deafness were not factors. However, these studies relate to visual acuity and not the production of a drawing as used by Getzels and Jackson (1962).

Creativity and Self-Evaluation

Golann (1963) reported several studies relating self-description and creativity by Barron who reported the low creative group to be contented and patient whereas the high creative group reported themselves to be gloomy and impatient; Van Zelst and Kerr (1954) who reported productive scientists as describing themselves to be original and curious; and Stein (1956) who reported that creative subjects regard themselves as assertive and authoritative, while the less creative regard themselves as quiescent and submissive.

In reference to a specific sentence completion instrument, Getzels and Jackson (1962) administered the G-J-G Verbal Thinking Speed Test and the G-J-G Test of Behavior as projective and direct tests that included many questions concerned with self-evaluation. Prior to 1962, Getzels and Walsh (1958) had worked with the method of paired direct and projective questionnaires in a study of attitude structure and socialization using an Index of Socialization measuring the discrepancy between the personal hypothesis (projective response) and expressed reaction (direct response).

Self-Evaluation of Deaf Subjects

Levine (1963) states that difficulties in psychological research of the deaf reach their peak in personality analysis. However, although still experimental, projective techniques show promise for the deaf. Levine (1963) notes that sentence completion tests are new techniques that are still at the exploratory level for use in evaluation of deaf subjects.

Ayers (1950) used the Rhode-Hildreth Sentence Completions with a group of deaf adolescents finding fewer self-justification needs among the deaf as compared with the hearing, but greater need for protection and sympathy to please, follow and admire; to relate facts, explain, interpret and judge.

Neyhus (1962) used the Rotter Incomplete Sentences Blank as part of a larger study with adult deaf aged 18 to 85. The findings on this projective test and the Rorshach Psychodiagnostic, Make-A-Picture Story Test, and the Human Figure Drawing Test, indicated the personality of the adult deaf to be concrete, rigid, and resistant to change. Low but significant correlations were found between language level and projective test scores and further study was suggested to clarify whether these tests were reflecting or distorting the actual personality functioning of the deaf.

There have been no studies using the Abbreviated Form VII, Minnesota Tests of Creative Thinking and the G-J-G Verbal Thinking Speed Test and the G-J-G Test of Behavior as described in Getzels and Jackson (1962). There have been no studies relating creativity and self-evaluation of deaf subjects.

Creativity and Career Aspirations

Getzels and Jackson (1962) discussed the career aspirations of the high creatives as described in the G-J-G Tests mentioned above. The high creatives were found to have mentioned a greater number of occupational goals as well as mentioning a significantly greater proportion of unconventional occupations. Torrance (1965) in his study of 115 creative high school seniors also found that the high creatives were attracted to the unconventional and unusual career choice.

Dauw (1965) found that high school seniors who scored high in originality on the Torrance Tests of Creative Thinking tended to be creative and unconventional, expressing stronger vocational needs than any other group.

Career Aspirations of Deaf Subjects

Myklebust (1964) in a study with 113 adult deaf using the Kuder Preference Test reported that the range of vocational choice of deaf subjects was remarkedly limited and unimaginative.

However, these choices may be realistic, for deafness imposes a major limitation as far as types of work are concerned. These findings were in agreement with Lunde and Bigman (1959) who felt that choices may reflect unconscious awareness that opportunities are limited.

Kohl (1966, p. 6) notes that the deaf are mostly in the lower socioeconomic job categories. In the New York State Psychiatric Institute population, 87.5 per cent of the deaf males were employed in manual labor category (30.4 per cent unskilled), and less than 3 per cent were employers or businessmen. Including all the male college graduates, 6 per cent were clerical workers. There were no professionals in the group.

The Advisory Committee's Report on Education of the Deaf (1965) concludes that most studies show twice the percentage of deaf persons employed in manual jobs than is the case with the general United States population. The generally accepted view is that the language and communication difficulties of the deaf are responsible for this waste of potential skills and abilities.

Turechek (1967) in his study of vocational aspirations of deaf high school boys found a tendency to overaspire on the part of the deaf subjects.

There have been no studies relating the Abbreviated Form VII, Minnesota Tests of Creative Thinking and specific career aspirations as expressed on a sentence completion test. There have been no studies relating creativity and career aspirations of deaf subjects.

Creativity and Teacher Evaluation

Getzels and Jackson (1962) found the high IQ group to be more desirable than the average student (as expressed by the mean of the total student population of 449 students on teacher ratings). The high creativity group was not as desirable as the average student. Torrance (1962) also found this to be true. Hasan and Butcher (1966) agreed concerning the relatively low approval for creative children but felt that it might not be the higher creativity as such but lower intelligence that affected the teacher ratings.

Whether teacher nominations may differentiate among creative groups has been the subject of studies by Vernon (1964) and Yamamoto (1962). These studies indicate that there is high correlation between teacher ratings and the Torrance Tests of Creative Thinking. However, Williams (1965) using only the originality scores on the Ask-and-Guess Test found one teacher out of six to be achieving differentiation at the .05 probability level.

Teacher Evaluation of Deaf Subjects

Studies previously mentioned (Birch and Birch 1951, 1956) (Birch, Birch and Stuckless 1963) have correlated teacher ratings and achievement of deaf subjects. Brill (1960) also used teacher ratings to study the comparative adjustment of three groups of deaf pupils.

There have been no studies relating the Abbreviated Form VII, Minnesota Tests of Creative Thinking and scores on a Teacher Rating as described in Getzels and Jackson (1962). There have been no studies relating creativity and teacher evaluation.

Creativity and Family Group

Getzels and Jackson (1962) found that the parents of the high IQ child tended to have a somewhat higher educational status than the parents of the high creatives, not so much in the general level of cultivation but in specialization of training. Despite greater professional training, a somewhat greater proportion of the mothers of the high IQ children are exclusively housewives and do not hold other full or part time jobs.

Dreyer and Wells (1966) found that the mothers of the more creative children engaged in more independence-granting and achievement-inducing behavior. The parents of the more creative children had less domestic value consensus and more role tension than the parents of the low creative children.

Deaf Subjects as Members of a Family Group

According to Kohl (1966, p. 2), the best estimates indicate that there are about 150,000 totally deaf individuals in the United States of which more than one half are congenitally deaf or deaf before the age of two whose hearing loss is at least 80 decibels in each ear and whose deafness interferes with the normal acquisition of language. The majority of marriages are to deaf people, and of the children born to deaf individuals ten per cent are born deaf. It has already been stated that the deaf are retarded in educational level and achievement and that the percentage of deaf subjects in the lower economic job categories is greater than that of the general population.

Public residential schools account for more than half of the deaf students in schools and classes for the deaf. These schools usually admit children at the age of four so that "as members of a family group" most deaf children differ in their total environment from hearing children.

There have been no studies using the Abbreviated Form VII, Minnesota Tests of Creative Thinking as related to a parent questionnaire with deaf subjects. There have been no studies relating creativity and family membership of deaf subjects.

Summary

There are discussions in the literature of creativity and intelligence, achievement, imagination, self-evaluation, career aspirations, teacher evaluation and family group membership. There are also discussions of deaf subjects in the areas of intelligence, achievement, imagination, self-evaluation, career aspiration, teacher evaluation and family group membership. There are no discussions of creativity and intelligence, achievement, self-evaluation, career aspiration, teacher evaluation, and family group membership of deaf subjects. Silver's study (1966) does deal with creativity and imagination of deaf subjects in the light of artistic ability to produce drawings but there is no investigation of creativity defined operationally by the Abbreviated Form VII, Minnesota Tests of Creative Thinking and the above mentioned variables.

Chapter 3

Design of the Study

Subjects

The 78 students enrolled in 1966-1967 in Grades Four, Five, Six, Seven, Eight, and the Vocational Class at the Boston School for the Deaf, Randolph, Massachusetts, were the subjects for this study.

The Boston School for the Deaf is one of four schools for the deaf in the state of Massachusetts. Although it is run by the Sisters of St. Joseph, it is nonsectarian. There are no tuition requirements. Students are accepted from the age of four and they may remain at the school until they have reached their eighteenth birthday. The school is both a residential and a day school. The higher percentage of the students are day students.

Table 1 indicates the final description of subjects of the study according to grade and sex.

TABLE 1

Description of Pupils in Study in Grades 4-8,
Boston School for the Deaf, 1966-1967

	Sex		
Grade	Boys	Girls	Total
Vocational		6	6
Eight	4	7	11
Seven	13	6	19
Six	5	4	9
Five	10	9	19
Four	2	8	10
Total	34	40	74

Tests

Six instruments were used: The Abbreviated Form VII, Minnesota Tests of Creative Thinking by E. Paul Torrance; The Performance Section of the Wechsler Intelligence Scale for Children or The Performance Section of the Wechsler Adult Intelligence Scale; The Stanford Achievement Test, Form W, Intermediate I or II or Advanced Level: Language, Paragraph Meaning, Arithmetic Computations, Arithmetic Concepts, Arithmetic Application; The Drawing Test of Getzels and Jackson; The G-J-G Verbal Thinking Speed Test and the G-J-G Test of

Behavior of Getzels and Jackson. A Teacher Rating and Parent Questionnaire were also obtained for each pupil in the study.

The Abbreviated Form VII, Minnesota Tests of Creative Thinking by E. Paul Torrance

These tests have been published with the knowledge that understanding about creative thinking is relatively undeveloped and still in an experimental state.

Torrance (1966) defines creativity as a

> Process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on: identifying the difficulty; searching for solutions, making guesses, or formulating hypotheses about the deficiencies; testing and retesting these hypotheses and possibly modifying and retesting them; and finally communicating the results /p. 6/.

With this extensive and global definition in mind, Torrance has attempted to construct test instruments that are models of the creative process, each test involving different kinds of divergent thinking and each test contributing something unique to the test battery.

The Abbreviated Form VII, Minnesota Tests of Creative Thinking, by E. Paul Torrance consists of four tasks, each taking ten minutes. They were selected as the four tasks which might yield the greatest amount of information concerning creative growth. Two of the tasks are primarily nonverbal and two are verbal.

Nonverbal

Task 1 Figure Completion

This task consists of 10 figures which are to be completed by the subject. This test is an adaptation of the Drawing Completion Test developed by Kate Franck and used in studies of creativity by Barron (1958).

Torrance (1966) refers to Gestalt psychology in noting that an incomplete figure sets up in an individual tensions to complete it in the simplest and easiest way possible. Thus, to produce an original response, the subject usually has to control his tension and delay gratification of the impulse to closure.

This figure is scored for fluency, flexibility, originality, and elaboration according to the instructions in the Manual (1966).

Task 2 Circles

This task consists of 36 circles drawn on one and one-half pages of white paper. The subject is instructed to make as many objects or pictures as possible from the circles in the time allowed.

According to Torrance (1966) the circle or closed figures require the ability to disrupt or destroy an already complete form.

A deliberate attempt is made to stimulate all four types of divergent thinking by this task and to set up a conflict among the response tendencies represented. Fluency is stimulated by the instructions, "See how many pictures you can make"; flexibility by: "Make as many different pictures and objects as you can"; originality by: "Try to think of things no one else will think of"; and elaboration by: "Put as many ideas as you can into each one and make them tell as complete and interesting a story as you can."

The Circle activity requires an ability to return to the same stimulus again and again perceiving it in different ways. It is scored according to Torrance's Manual (1963) for fluency, flexibility, originality, and elaboration.

Verbal

Task 3 Product Improvement

According to Torrance's Manual (1963), the subject is instructed to list the changes he would make to improve a toy dog that has been sketched on a plain piece of white paper, so that the dog would be more fun to play with. This is a complex task enabling subjects to indicate ideas that they would not dare use in reference to a more serious task. It is "interesting" to the subject and has a high degree of face validity.

The fluency score for this activity is the number of relevant responses produced. The flexibility score is the number of different approaches used in producing ideas for improvement. The originality score is based on the statistical infrequency and appropriateness of the ideas produced. The elaboration score is the number of different ideas or details given in elaborating or spelling out the ideas produced.

Task 4 Unusual Uses (Tin Cans)

The subject is instructed to list as many interesting and unusual uses he can think of for tin cans. The activity is a direct modification of Guilford's Brick Uses Test. Torrance (1963) substituted tin cans for bricks because he believed that children would respond more creatively to tin cans for they are more available than bricks for play activities.

This task is in part, a test of the ability to free one's mind from a well-established set. It may be scored for fluency: the number of relevant responses produced by a subject; for flexibility: the number of shifts in thinking or number of different categories of questions, causes or consequences; for originality: the statistical infrequency of these questions, causes or consequences or the extent to which the response represents a mental leap or departure from the obvious or commonplace; for elaboration: the detail and specificity incorporated into the questions and hypotheses, according to the Manual (1963).

Reliability of The Torrance Tests of Creative Thinking

Torrance (1966) notes that emotional, physical, motivational, and mental health factors affect creative functioning and development and may contribute to a lowering of test retest reliability as traditionally estimated.

As these tests are still in the experimental state, it is impossible to report research studies in the literature in reference to a specific group. Reliability estimates vary in reference to various studies. There have been no reliability studies using this battery with deaf students.

In reference to students of approximately the same age as the subjects of this study and using some of the same subtests, Torrance (1966) cites Eherts (1961) who reported a test-retest reliability of .88 for 29 fifth grade pupils with an elapsed time of seven months between testings, and Mackler (1962) who obtained reliabilities of .61, .62, and .71 for fluency, flexibility, and originality between first and second testings; .75; .74 and .66 between second and third testings, and .65, .71 and .60 between the first and third testings. Yamamoto's (1962) subjects obtained a reliability of .75, .60 and .64 for college students on Unusual Uses of tin cans; and .69, .64 and .61 on the Product Improvement Test, and .76, .63, and .79 on the Circles Test. Grover (1964) obtained a reliability of .69 on the Circles Test for 101 ninth grade students.

Rouse (1965) using the Product Improvement Test with 31 mentally retarded youngsters with an elapsed interval of about six months obtained reliabilities of .85, .76 and .68.

Validity of the Torrance Tests of Creative Thinking

There have been several reviews of the validity problem: Taylor and Barron (1963), Taylor (1964), Yamamoto (1965), Mackler and Shontz (1965), and Wallach and Kogan (1965). Torrance (1966) notes that all these reviews impress one with the complexity of the problem of finding an overall measure of validity. Thus, Torrance (1966) defines creativity as a process, and the battery of tests devised as sampling creative abilities but not sampling the entire universe of creative abilities.

As this battery is experimental, the validity estimates (as did the reliability estimates) vary with the groups on which they are used. Torrance (1966) reviews a large number of studies that relate to the construct validity of these tests in reference to children, high school students and adults.

The Wechsler Intelligence Scale for Children (WISC) and the Wechsler Adult Intelligence Scale (WAIS). (Performance Sections).

The Wechsler Scales are individual intelligence tests consisting of two sections: Verbal and Performance. The WISC was prepared for those under 15 and the WAIS for adults ages 15 to 64.

The Performance Scale of the WAIS consists of five sub-tests: Digit Symbol, Picture Completion, Block Design, Picture Arrangement and Object Assembly. The Performance Scale of the WISC also consists of five sub-tests with the Coding Test corresponding to the Digit Symbol test of the WAIS.

Reliability

The WAIS Manual (1955) reports standard errors of measurement for Performance I.Q. just under 4 points and reliability coefficients of .93 and .94.

The WISC Performance Scale reliability coefficients were reported as .86, .89 and .90.

Validity

Wechsler (1955) reports a correlation of .69 for 52 cases of WAIS I.Q.'s performance scale and I.Q.'s obtained on the *Stanford-Binet*.

In reviewing intelligence tests enjoying wide acceptance and application by psychologists and personnel workers with hearing impaired children, the performance scales of the WAIS and the WISC were selected as the best tests at present and the tests yielding most relatively valid IQ by Vernon and Brown (1964).

The Stanford Achievement Test Form W Level: Intermediate I or II or Advanced (dependent upon grade level) Tests: Paragraph Meaning, Language, Arithmetic Computations, Arithmetic Concepts, Arithmetic Applications.

This test offers a continuous measure of school achievement in the subject areas selected. The test content was based on analysis of curricula and textbooks and prejudging by subject matter specialists. The test was first published in 1923 but has been revised. The latest revision was published in 1964 based on a standardization sample selected from four geographic regions and five system types. The sample per grade ranged from a low of 3,352 in grade 9 to a high of 16,175 in grade 4. Grade 9 was the only sample of less than 9,000 pupils.

The specific areas of study: Verbal and Numerical were the areas selected by Getzels and Jackson (1962). Their study used data from several different tests whereas in this study only the Stanford Achievement Test was used.

Reliability

The split half and Kuder Richardson coefficients of reliability are as high as those reported for any of the currently available standardized achievement tests. They range from .86 to .93 for the total test. The coefficients vary for each subtest and grade level as reported in the Manual (1964).

Several studies indicate the use of the Stanford Achievement Test with deaf students: Birch and Birch (1951, 1956).

Birch, Birch and Stuckless (1963) reported a correlation of .63 between the Leiter International Performance Scale and the Stanford Achievement Test scores six years after the first administration.

The Drawing Test

The test instrument was a sheet of paper with a lined border, approximately 5 1/2 by 7 1/2 inches. Under the border was the title "Playing Tag in the School Yard."

The use of this particular test has not been reported as having been used with deaf students.

The G-J-G Verbal Thinking Speed Test

This instrument is a conventional sentence completion test. It is described and illustrated by Getzels and Jackson (1962). It consists of 60 open-ended sentence items and was modified for language for the use of deaf children. (Appendix A). The total score is the summation of the positive scores according to the scoring key. (Appendix C). This instrument is a projective test disguised as a speed test written in the third person using boys' names for the male subjects and girls' names for the female subjects.

The G-J-G Test of Behavior

This instrument is the same as the G-J-G Verbal Thinking Speed Test except that the sentences completion items are written in the first person and the test is not disguised as a speed test. This direct form of the test was modified in the same way that the projective instrument was to make the language problem less difficult for the deaf subjects. (Appendix B). The total score is the summation of the positive scores according to the scoring key. (Appendix C).

The Teacher Rating

The Teacher Rating consisted of four items upon which the principal of the school rated the students. Three of the areas upon which the students were rated were the same as those selected by Getzels and Jackson (1962); general desirability as a student, leadership, ability to become involved in learning activities. A fourth area, creativity, was added by the investigator. (Appendix D).

The subjects were rated from 1 - 5; low to high on these four categories.

Parent Questionnaire

The instrument as described in Appendix E was based on the Parent Questionnaire used by Getzels and Jackson (1962). Some questions were added by the principal for the purposes of school record information and other questions were added as possibly having particular significance for deaf children.

Administration and Scoring of Tests

The Abbreviated Form VII, Minnesota Tests of Creative Thinking

This test was administered by the classroom teachers during class sessions in 1966. Observation of selected administrations by the writer indicated the subjects should have understood their tasks as far as directions were concerned.

The tests were scored under the direction of E. Paul Torrance at the University of Minnesota and later the University of Georgia.

The subjects were divided according to sex and age as described in Table 2.

TABLE 2

Number of Pupils in Study According to Age and Sex

Sex	Age		Total
	Over 14	Under 14	
Girls	21	19	40
Boys	19	15	34
Total	40	34	74

The seven subjects in each cell in Table 3 represent the highest seven scores and the lowest seven scores on the Abbreviated Form VII, Minnesota Tests of Creative Thinking. The subjects have been grouped according to age and sex as in Table 2.

TABLE 3

Number of Pupils in Each Group According to Age, Sex and Creativity

Creativity	Girls		Boys	
	Under 14	Over 14	Under 14	Over 14
Most	7 (1)	7 (3)	7 (5)	7 (7)
Least	7 (2)	7 (4)	7 (6)	7 (8)
Total	14	14	14	14

The parenthesis indicates the Group number and is described in Table 4.

TABLE 4

Summary of Groups in Study

Group	Description		
	Sex	Age	Creativity
1	female	under 14	high
2	female	under 14	low
3	female	over 14	high
4	female	over 14	low
5	male	under 14	high
6	male	under 14	low
7	male	over 14	high
8	male	over 14	low

Table 5 indicates the differences between the "most" creative and "least" creative groups. Groups one, three, five and seven are "most" creative. Groups two, four, six and eight are "least" creative.

TABLE 5

Differences Between the Most Creative and Least Creative Groups on the Abbreviated Form VII, Minnesota Tests of Creative Thinking

Group				t	P
No.	Mean	No.	Mean		
1	354.00	2	273.28	9.64	.001
1	354.00	4	301.00	8.49	.001
1	354.00	6	289.57	3.64	.01
1	354.00	8	311.43	4.82	.001
3	360.57	2	273.29	8.06	.001
3	360.57	4	301.00	6.42	.001
3	360.57	6	289.57	3.74	.01
3	360.57	8	311.43	4.39	.001
5	387.86	2	273.28	5.64	.001
5	387.86	4	301.00	4.45	.001
5	387.86	6	289.57	3.84	.01
5	387.86	8	311.43	3.73	.01
7	361.29	2	273.28	10.56	.001
7	361.29	4	301.00	9.74	.001
7	361.29	6	289.57	4.06	.01
7	361.29	8	311.43	5.67	001

All the "most" creative groups were significantly different from the "least" creative groups beyond the .01 level of probability.

Intelligence Test

The WISC or the WAIS performance sections were administered by the Saint Joseph's Educational Clinic in the Spring of 1967.

The scoring was completed by the administrator of each test according to the Manuals (Wechsler 1949, 1955). The means and standard deviations of the groups on the WAIS or WISC are reported in Table 6.

TABLE 6

Mean and Standard Deviation of Groups on WAIS or WISC

Group	N	Mean	SD
1	7	88.57	11.77
2	7	100.86	14.03
3	7	93.43	11.13
4	7	94.43	9.64
5	7	113.14	13.99
6	7	96.14	18.15
7	7	102.29	14.11
8	7	98.00	9.34

Achievement Tests

The Stanford Achievement Tests were administered by the classroom teachers during the Spring of 1966.

The teachers found it extremely difficult to administer the test because the students had never taken the test before and they had little if any test taking experience with tests of this nature. In addition, the language level was too difficult for the students, and the students were upset when they saw the grade level on the test folder and found they could not answer the first item.

The scoring was completed by Harcourt, Brace and World Scoring Service and the means and standard deviations of the groups are reported in Table 7.

TABLE 7

Mean and Standard Deviation of Groups on Stanford Achievement Tests Verbal and Numerical

Group	Verbal			Numerical	
	N	Mean	SD	Mean	SD
1	7	1.64	0.69	1.77	0.41
2	7	1.60	0.45	1.67	0.46
3	7	1.79	0.39	2.29	0.76
4	7	2.07	0.73	2.93	0.48
5	7	2.07	1.20	2.97	0.94
6	7	1.30	0.38	1.87	0.33
7	7	2.00	0.41	2.51	0.74
8	7	1.71	0.49	2.53	0.99

Drawing Test

The Drawing Test was administered by the classroom teacher in the Spring of 1967 during a class period. The students were told that they could draw any picture that they wished on the paper concerned with the subject "Playing Tag in the Schoolyard."

Scoring categories other than those selected by Getzels and Jackson (1962) were added by the investigator to provide additional information: picture: light or dark; size of figures: large (over 2") or small; authority figure present or absent; figures in the picture the same sex or not the same sex; a tree is present or not present; there are one or less pieces of school equipment or more; there is a school building present or absent.

The scoring of the Drawing Test presented problems of subjectivity and consistency. Accordingly, two other scorers (male graduate students) in Boston College scored a random selection of 20 Drawing Tests. The scorer agreement on each item by the three scorers is presented in Table 8.

TABLE 8

Percentage of Agreement Between Scorers on 13 Categories of the Drawing Test for 20 Subjects

Category	Scorer	
	1-2	1-3
1. Stimulus free - bound	75	65
2. Humor present - absent	75	55
3. Building labeled - unlabeled	100	95
4. Detail free - bound	55	75
5. Light - dark	85	65
6. Size large - small	95	60
7. Authority present - absent	95	65
8. Sex same - mixed	100	90
9. Number less than four - four or more	100	95
10. Figures touching - not touching	90	95
11. Tree present - absent	100	95
12. Equipment one or less - more	95	90
13. Building present - absent	70	75

2

The G-J-G Tests

Both the projective and direct forms of the G-J-G test were administered by the classroom teachers during class sessions in the Spring of 1967. The two forms were given at the same time to minimize the language problem for the deaf subjects.

Although the forms had been modified for use with the deaf subjects, the test instruments presented extreme difficulty to the subjects. The subjects complained that the test was too long and much too difficult. They did not understand many of the sentences.

The classroom teachers also felt that the test was too long and difficult particularly for the students in Grades 4 and 5. They felt that the results of these tests would be unreliable and invalid. Super and Crites (1962) state that scoring of open-end tests presents problems of norms and scorer consistency. In scoring this test, there was an added problem of whether or not the subject understood the sentence and whether he possessed the language ability or facility to answer the question. The responses were scored positive or negative according to the scoring key (Appendix C). Total positive scores were reported and total negative scores. Categories were added so that specific items might be further studied. Tables 9 and 10 indicate the total scores of the subjects and the specific categories reported.

TABLE 9

Mean of Groups on the G-J-G Verbal Thinking Speed Test (Projective)

Group	N	Mean
1	7	13.86
2	7	12.14
3	7	8.57
4	7	11.14
5	7	11.14
6	7	11.43
7	7	8.86
8	7	4.00

TABLE 10

Mean of Groups on the G-J-G Test of Behavior

(Direct)

Group	N	Mean
1	7	13.57
2	7	13.29
3	7	11.00
4	7	10.86
5	7	14.14
6	7	12.29
7	7	9.71
8	7	3.71

The same male students who scored the Drawing Test also scored twenty G-J-G tests both projective and direct. Table 11 indicates the correlation coefficients for scorers one and two and one and three.

TABLE 11

Correlation Coefficients for Scorers on the Two G-J-G Tests

Test	Scorer Agreement	
	1 - 2	1 - 3
G-J-G Direct	.79	.85
G-J-G Projective	.85	.88

Scorers one and two and one and three indicated a correlation or a scorer agreement that was significant beyond the .01 level of probability.

Teacher Rating

The Teacher Rating (Appendix D) was completed in the Spring of 1967 by the principal of the school who knew each student intimately. The first three categories were the same as those used by Getzels and Jackson (1962). The fourth category: creativity was added by the investigator. Each subject was given a rating from 1 to 5.

Table 12 indicates the means and standard deviations of the groups on each category.

TABLE 12

Means and Standard Deviations of Groups on the Teacher Rating

Group	N	Desirability		Leadership		Ability to be Involved		Creativity	
		Mean	S. D.	Mean	S. D.	Mean	S. D.	Mean	S. D.
1	7	3.57	0.54	3.00	0.58	3.29	0.76	3.00	0.00
2	7	3.71	0.49	3.00	0.82	3.71	0.49	3.14	0.38
3	7	3.43	0.54	3.43	0.79	3.43	0.79	3.29	0.49
4	7	3.71	0.76	2.71	0.95	3.00	0.49	3.14	0.38
5	7	3.71	0.49	2.86	0.69	3.86	0.69	3.29	0.49
6	7	2.86	0.90	2.57	0.79	2.86	0.69	2.71	0.49
7	7	3.57	0.54	3.00	0.00	3.29	0.49	3.14	0.38
8	7	3.29	0.49	3.00	1.00	3.00	0.58	2.86	0.38

Parent Questionnaire

The Parent Questionnaire was mailed to the parents of the students in the Spring of 1967 with a note from the principal explaining the importance of the information to be obtained and the desirability of returning the form promptly. Permission was signed by the parents to allow the use of the information obtained.

The scoring was done by grouping the information according to selected categories: father's educational level; mother's educational level; father's occupational level according to Warner (1966); whether the mother works or not, whether the parent is satisfied with the child's career choice, and whether the child has one or more hobbies.

Treatment of the Data

All data were recorded on punched cards to permit automatic data processing. Each card was identified by a serial number. The serial number included the sex of the student. Each card included: 1) the creativity combined score; 2) the WISC or WAIS Performance Score, the average stanine scores on the Stanford Achievement Test for 3) Paragraph Meaning and Language, and for 4) Arithmetic Computation, Concepts and Application; 5) the scores on the four Teacher Rating categories; 6) the Drawing Test scores; 7) the total G-J-G projective and direct positive and negative total scores; 8) the scores on selected items of the parent questionnaire and 9) the scores of scorers two and three on the 20 G-J-G projective and direct instruments.

A second card deck was punched to indicate the serial number of each student and the scores of scorers one, two, and three on each item of the Drawing Test.

Automatic data processing was employed using the data-text program on the Model II IBM 7094 computer at Harvard University and the IBM 1620 computer at Boston College.

Chapter 4

Analysis of the Data

This study consisted of analyses of relationships between creativity test scores and scores on: an intelligence test, achievement tests, drawing test, two sentence completion tests, a teacher rating, and a parent questionnaire. The subjects of the study were students at the Boston School for the Deaf in Randolph, Massachusetts, and included all students in grades four through eight. Any results that did not reach the .05 level of probability were considered not significant. Only when results were significant was there discussion immediately following presentation of the data.

Hypothesis 1 concerns the relationship between the means on the WISC or WAIS Performance Scales for students at different age levels scoring high on the Abbreviated Form VII, Minnesota Tests of Creative Thinking and students scoring low on the Abbreviated Form VII, Minnesota Tests of Creative Thinking. This hypothesis was tested by a three way analysis of variance. Results of the analysis of variance for the relationship between means of high and low creativity groups grouped by age: over 14 and under 14, and sex are shown in Table 13.

TABLE 13

Three-Way Analysis of Variance for IQ Means of Students Grouped According to Sex, Age, and Creativity Level

Source of Variation	df	Sums of Squares	Mean Square	F
Between Sexes	1	912.06	912.06	5.35
Between Age Groups	1	97.75	97.75	.57
Between Creativity Groups	1	56.00	56.00	.33
Sex X Age	1	48.31	48.31	.28
Sex X Creativity	1	1045.81	1045.81	6.11
Age X Creativity	1	1.81	1.81	.01
Sex X Age X Creativity	1	504.06	504.06	2.96
Within	48	8185.19		
Total	55	10850.99		

The difference in means of IQ scores between sexes has an F value of 5.35 which is significant beyond the .05 level of probability.

The difference in means of IQ scores considered in relation to sex and creativity has an F value of 6.11 which is significant beyond the .01 level of probability.

Hypothesis 2 concerns the relationship between the means on the Stanford Achievement Test for students scoring high on the Abbreviated Form VII, Minnesota Tests of Creative Thinking and students scoring low on the Abbreviated Form VII, Minnesota Tests of Creative Thinking.

Two three-way analyses of variance were used to examine the differences between the means of stanine scores on the Stanford Achievement Tests that represented Verbal ability and the Stanford Achievement Tests that represented Numerical ability.

Table 14 indicates the results of the three-way analysis of variance using the mean of the stanine scores on the Paragraph Meaning Test and Language Test of the Stanford Achievement Test Battery for high and low creativity groups grouped by age and sex.

TABLE 14

Three-Way Analysis of Variance for Stanford Verbal Achievement Battery Means of Students Grouped According to Sex, Age, and Creativity Level

Source of Variation	df	Sums of Squares	Mean Square	F
Between Sexes	1	0.02	0.02	.00
Between Age Groups	1	80.16	80.16	1.90
Between Creativity Groups	1	58.02	58.02	1.38
Sex X Age	1	6.45	6.45	.15
Sex X Creativity	1	147.87	147.87	3.51
Age X Creativity	1	58.02	58.02	1.38
Sex X Age X Creativity	1	2.16	2.16	.05
Within	48	2024.29		
Total	55	2376.99		

The F values are not significant.

Table 15 indicates the results of the three-way analysis of variance using the mean of the stanine scores for Arithmetic Computations, Arithmetic Concepts and Arithmetic Application Tests of the Stanford Achievement Test for high and low creativity groups grouped by age and sex.

TABLE 15

Three-Way Analysis of Variance for Stanford Numerical Achievement Battery Means of Students Grouped According to Sex, Age, and Creativity Level

Source of Variation	df	Sums of Squares	Mean Square	F
Between Sexes	1	132.07	132.07	2.84
Between Age Groups	1	340.07	340.07	7.31
Between Creativity Groups	1	25.79	25.79	.55
Sex X Age	1	216.07	216.07	4.64
Sex X Creativity	1	232.07	232.07	4.99
Age X Creativity	1	301.79	301.79	6.48
Sex X Age X Creativity	1	12.07	12.07	.26
Within	48	2234.29		
Total	55	3494.22		

The difference in means of Stanford Achievement Battery Numerical scores among age groups has an F value of 7.31 which is significant beyond the .01 level of probability.

The difference in means of Stanford Achievement Battery

Numerical scores as related to sex and age has an F value of 4.64 which is significant beyond the .05 level of probability.

The difference in means of the Stanford Achievement Battery Numerical test scores as related to sex and creativity has an F value of 4.99 which is significant beyond the .05 level of probability.

The difference in means of the Stanford Achievement Battery Numerical scores as related to age and creativity has an F value of 6.48 which is significant beyond the .05 level of probability.

Hypothesis 3 concerns the differences between the means of Teacher Ratings for students scoring high on the Abbreviated Form VII, Minnesota Tests of Creative Thinking Battery and students scoring low on the Abbreviated Form VII, Minnesota Tests of Creative Thinking.

Four three-way analyses of variance were required to examine the differences between the means of scores on the Teacher Ratings that were concerned with desirability as a student, the ability of the student to become involved in learning activities, and leadership ability and creativity.

Table 16 indicates the results of the three-way analysis of variance using the mean of scores on the Teacher Rating concerned with desirability as a student for high and low creativity groups grouped by age and sex.

TABLE 16

Three-Way Analysis of Variance for Teacher Rating of Desirability as a Student for Students Grouped According to Sex, Age, and Creativity Level

Source of Variation	df	Sums of Squares	Mean Square	F
Between Sexes	1	0.88	0.88	0.37
Between Age Groups	1	0.02	0.02	0.05
Between Creativity Groups	1	0.45	0.45	1.21
Sex & Age	1	0.16	0.16	0.44
Sex & Creativity	1	2.16	2.16	5.86
Age & Creativity	1	0.45	0.45	1.21
Sex & Age & Creativity	1	0.16	0.16	0.44
Within	48	17.71		
Total	55	21.99		

The difference in means of the Teacher Rating concerned with desirability as a student as related to sex and creativity has an F value of 5.86 which is significant beyond the .05 level of probability.

Table 17 indicates the results of the three-way analysis of variance using the mean of scores on Teacher Ratings concerned with the ability to become involved in learning activities for high and low creativity groups grouped by age and sex.

TABLE 17

Three-Way Analysis of Variance for Teacher Rating of Ability to Become Involved in Learning Activities for Students Grouped According to Sex, Age, and Creativity Level

Source of Variation	df	Sums of Squares	Mean Square	F
Between Sexes	1	0.16	0.16	0.26
Between Age Groups	1	0.88	0.88	1.41
Between Creativity Groups	1	1.45	1.45	2.34
Sex & Age	1	0.02	0.02	0.03
Sex & Creativity	1	1.45	1.45	2.34
Age & Creativity	1	0.02	0.02	0.03
Sex & Age & Creativity	1	2.16	2.16	3.49
Within	48	29.71		
Total	55	35.85		

The F values are not significant.

Table 18 indicates the results of the three-way analysis of variance using the mean scores on the Teacher Rating concerned with leadership ability for high and low creativity groups grouped by age and sex.

TABLE 18

Three-Way Analysis of Variance for Teacher Rating of Leadership Ability for Students Grouped According to Sex, Age, and Creativity Level

Source of Variation	df	Sums of Squares	Mean Square	F
Between Sexes	1	0.45	0.45	0.77
Between Age Groups	1	0.45	0.45	0.77
Between Creativity Groups	1	0.88	0.88	1.52
Sex & Age	1	0.16	0.16	0.28
Sex & Creativity	1	0.16	0.16	0.28
Age & Creativity	1	0.87	0.16	0.28
Sex & Age & Creativity	1	27.71	0.87	1.52
Within	48	30.68		
Total	55	61.36		

The F values are not significant.

Table 19 indicates the results of the three-way analysis of variance using the mean scores on the Teacher Rating concerned with creativity for high and low creativity groups grouped by age and sex.

TABLE 19

Three-Way Analysis of Variance for Teacher Rating of Creativity for Students Grouped According to Sex, Age, and Creativity Level

Source of Variation	df	Sums of Squares	Mean Square	F
Between Sexes	1	0.29	0.29	1.78
Between Age Groups	1	0.07	0.07	0.44
Between Creativity Groups	1	0.64	0.64	4.00
Sex & Age	1	0.07	0.07	0.45
Sex & Creativity	1	0.64	0.64	4.00
Age & Creativity	1	0.00	0.00	0.00
Sex & Age & Creativity	1	0.29	0.29	1.78
Within	48	7.71		
Total	55	9.71		

The F values are not significant.

Hypothesis 4 concerns the relationship between the means on two forms of the G-J-G Test for students scoring high on the Abbreviated Form VII, Minnesota Tests of Creative Thinking and students scoring low on the Abbreviated Form VII, Minnesota Tests of Creative Thinking.

Two three-way analyses of variance were required to examine the differences between the means of scores on the two forms of the G-J-G Test.

Table 20 indicates the results of the three-way analysis of variance using the mean of the positive scores on the G-J-G Verbal Thinking Speed Test (Projective) for high and low creativity groups grouped by age and sex.

TABLE 20

Three-Way Analysis of Variance for the Means on the G-J-G Verbal Thinking Speed Test for Students Grouped According to Sex, Age, and Creativity Level

Source of Variation	df	Sums of Squares	Mean Square	F
Between Sexes	1	92.57	92.57	1.78
Between Age Groups	1	224.00	224.00	4.30
Between Creativity Groups	1	12.07	12.07	0.23
Sex & Age	1	10.29	10.29	0.20
Sex & Creativity	1	25.79	25.79	0.50
Age & Creativity	1	0.64	0.64	0.01
Sex & Age & Creativity	1	77.78	77.78	1.50
Within	48	2497.71		
Total	55	2940.85		

The difference in means on the G-J-G Verbal Thinking Speed Test as related to age has an F value of 4.30 which is significant beyond the .05 level of probability.

Table 21 indicates the results of the three-way analysis of variance using the mean of the positive scores on the G-J-G Test of Behavior (Direct) for high and low creativity groups grouped by age and sex.

TABLE 21

Three-Way Analysis of Variance for the G-J-G Test of Behavior of Students Grouped According to Sex, Age, and Creativity Level

Source of Variation	df	Sums of Squares	Mean Square	F
Between Sexes	1	68.64	68.64	1.07
Between Age Groups	1	283.50	283.50	4.42
Between Creativity Groups	1	60.07	60.07	0.94
Sex & Age	1	56.00	56.00	0.87
Sex & Creativity	1	48.29	48.29	0.75
Age & Creativity	1	14.00	14.00	0.22
Sex & Age & Creativity	1	16.07	16.07	0.25
Within	48	3079.14		
Total	55	3625.71		

The difference in means of the G-J-G Test of Behavior as related to age has an F value of 4.42 which is significant beyond the .05 level of probability.

Summary for Hypotheses 1-4

The first four hypotheses are summarized as a unit since they were tested using the three-way analysis of variance technique. The subjects were grouped by age, sex, and level of creativity. The analysis of variance in each hypothesis examined the means on selected tests in relation to age, sex, and level of creativity.

Hypothesis 1

The male subjects were found to be significantly different in the direction of higher scores from the female subjects in IQ score as measured by the WAIS or WISC. (F value significant beyond the .05 level of probability).

There were no significant differences found among age groups or creativity groups.

There were no significant differences found when the subjects' scores were considered in relation to sex and age. However, there were significant differences when the means were considered in relation to sex and creativity level. (F value significant beyond the .01 level of probability).

Table 22 indicates the t test scores that were significant when the groups were analyzed separately.

TABLE 22

Significant t Test Results for Means on IQ Tests

Group				t	P
No.	Mean	No.	Mean		
5	113.14	1	88.57	3.56	.01
5	113.14	3	93.43	2.92	.05
5	113.14	4	94.43	2.91	.05
5	113.14	8	98.00	2.38	.05

N of each Group = 7.

Thus, there was a significant difference between females and males on IQ and creativity particularly in reference to males under 14 in the high creativity group in the direction of a higher mean score for the boys. There was also a significant difference in IQ mean scores for boys under 14 in the high creativity group and boys over 14 in the low creativity group, the boys under 14 in the high creativity group having the higher mean score.

Hypothesis 2 concerned achievement test means grouped according to sex, age, and creativity level. There were no significant results indicated between Verbal achievement and sex, age, and creativity level. There were significant differences between Numerical achievement test means as related to age (F significant beyond the .01 level of probability); sex and age (F significant beyond the .05 level of probability); sex and creativity (F significant beyond the .05 level of probability); and sex, age, and creativity (F significant beyond the .05 level of probability).

The groups were analyzed separately as shown in Table 4 and the significant _t_ test results indicated in Table 23.

TABLE 23

Significant _t_ Test Results for Means on Numerical Achievement Tests

Group				_t_	P
No.	Mean	No.	Mean		
4	2.93	1	1.77	4.85	.001
5	2.97	1	1.77	3.09	.01
7	2.51	1	1.77	2.32	.04
4	2.93	2	1.67	4.99	.001
5	2.97	2	1.67	3.27	.01
7	2.51	2	1.67	2.55	.03
4	2.93	6	1.87	4.79	.001
5	2.97	6	1.87	2.91	.02

N of each Group = 7.

Thus, there were significant differences between sex, age, and creativity for Numerical achievement particularly in reference to females under 14 in the high creativity group in the direction of a lower mean score. There were also differences in Numerical achievement for females and males under 14 in the low creativity group in the direction of a lower mean score.

Hypothesis 3 concerned the means on Teacher Ratings grouped by sex, age, and creativity level. There were significant differences between means on the Teacher Rating concerned with desirability as a student and sex and creativity (F significant beyond the .01 level of probability).

The groups were analyzed separately as shown in Table 4 and the significant *t* test results indicated in Table 24.

TABLE 24

Significant *t* Test Results for Means on Teacher Rating Desirability as a Student

Group				*t*	P
No.	Mean	No.	Mean		
2	3.71	6	2.86	2.21	.05
5	3.71	6	2.86	2.22	.05

N of each Group = 7.

Thus, there were significant differences in desirability as a student between boys and girls under 14 in the low creativity group in the direction of a higher mean score for the girls. There was also a significant difference between the high and low creativity group of the boys under 14 in the direction of a higher mean score for the high creative boys.

There were no significant differences found between the means of Teacher Ratings for: ability to become involved in learning activities, leadership ability, or creativity.

Hypothesis 4 concerned the means on two forms of the G-J-G Test grouped by sex, age, and creativity level. There were significant differences between age groups over 14 and under 14 (F significant beyond the .05 level of probability in both forms), with those subjects under 14 obtaining a higher mean on both forms. The groups were analyzed separately as shown in Table 4 and the significant _t_ test results are indicated in Table 25 and Table 26.

TABLE 25

Significant _t_ Test Results for Means on the G-J-G Verbal Thinking Speed Test

Group				_t_	P
No.	Mean	No.	Mean		
1	13.86	8	4.00	2.56	.03

N of each Group = 7.

Thus, there was a significant difference between the girls under 14 high creatives and the boys over 14 low creatives in the direction of a higher mean score for the girls.

TABLE 26

Significant t Test Results for Means on the G-J-G Test of Behavior

Group				t	P
No.	Mean	No.	Mean		
1	13.57	8	3.71	2.30	.04
2	13.29	8	3.71	2.24	.05
5	14.14	8	3.71	2.44	.04

N of each Group = 7.

Thus, there was a significant difference between the girls under 14 high creatives and low creatives and the boys over 14 low creatives in the direction of a higher mean score for the girls. There was also a significant difference between the boys under 14 high creatives and boys over 14 low creatives in the direction of a higher mean score for the boys under 14 low creatives.

Hypothesis 5 concerns the frequency of responses that have been classified on the Drawing Test according to categories.

Table 27 indicates the results of chi-square for the Drawing Test: stimulus free vs. stimulus bound for the "most" and "least" creative subjects.

TABLE 27

Chi-square Test for Responses on the Drawing Test (Stimulus Free vs. Stimulus Bound)and Creativity Groups

		Stimulus			
		Free	Bound	Total	Percent
Creativity	Most	5	23	28	50.0
	Least	6	22	28	50.0
	Total	11	45	56	
	Percent	19.6	80.4		100.0

Chi-square = 0.0 Not significant

Table 28 indicates the results of chi-square for the Drawing Test: humor present vs. absent for the most and least creative subjects.

TABLE 28

Chi-square Test for Responses on the Drawing Test (Humor Present vs. Humor Absent) and Creativity Groups

		Humor			
		Present	Absent	Total	Percent
Creativity	Most	9	19	28	50.0
	Least	5	23	28	50.0
	Total	14	42	56	
	Percent	25.0	75.0		100.0

Chi-square = 0.86 Not significant

There was no violence present in the drawings of the "most" creative or "least" creative subjects so that chi-square was not computed.

Table 29 indicates the results of chi-square for the Drawing Test: building labeled vs. building not labeled and creativity groups.

TABLE 29

Chi-square Test for Responses on the Drawing Test (Building Labeled vs. Building not Labeled) and Creativity Groups

		Building			
		Label	No Label	Total	Percent
Creativity	Most	5	23	28	50.0
	Least	5	23	28	50.0
	Total	10	46		
	Percent	17.9	82.1		100.0

Chi-square = 0.0

Table 30 indicates the results of chi-square for the Drawing Test: detail free vs. detail bound for the most and least creative subjects.

TABLE 30

Chi-square Test for Responses on the Drawing Test (Detail Free vs. Detail Bound) for the Most and Least Creative Subjects

		Detail			
		Free	Bound	Total	Percent
Creativity	Most	9	19	28	50.0
	Least	6	22	28	50.0
Total		15	41	56	
Percent		26.8	73.2		100.0

Chi-square - 0.36 Not significant

Table 31 indicates the results of chi-square for the Drawing Test: light vs. dark for the most and least creative subjects.

TABLE 31

Chi-square Test for Responses on the Drawing Test (Light vs. Dark) and Creativity Groups

		Light			
		Light	Dark	Total	Percent
Creativity	Most	7	21	28	50.0
	Least	10	18	28	50.0
Total		17	39	56	
Percent		30.4	69.6		100.0

Chi-square = 0.34 Not significant

Table 32 indicates the results of chi-square for the Drawing Test: size large vs. size small for the most and least creative subjects.

TABLE 32

Chi-square Test for Responses on the Drawing Test (Size Large vs. Size Small) and Creativity Groups

		Size			
		Large	Small	Total	Percent
Creativity	Most	25	3	28	50
	Least	27	1	28	50
Total		52	4	56	
Percent		92.9	7.1		100.0

Chi-square = 0.27 Not significant

Table 33 indicates the results of chi-square for the Drawing Test: authority figure present vs. authority figure absent for the most and least creative subjects.

TABLE 33

Chi-square Test for Responses on the Drawing Test (Authority Figure Present vs. Authority Figure Absent) and Creativity Groups

		Authority Figure			
		Present	Absent	Total	Percent
Creativity	Most	7	21	28	50.0
	Least	4	24	28	50.0
Total		11	45	56	
Percent		19.6	80.4		100.0

Chi-square = 0.45 Not significant

Table 34 indicates the results of chi-square for the Drawing Test: all figures the same sex vs. boys and girls for the most and least creative subjects.

TABLE 34

Chi-square Test for Responses on the Drawing Test (All Figures the Same Sex vs. Boys and Girls) and Creativity Groups

		Sex			
		Same	Mixed	Total	Percent
Creativity	Most	7	21	28	50.0
	Least	10	18	28	50.0
Total		17	39	56	
Percent		30.4	69.6		100.0

Chi-square = 0.34 Not significant

Table 35 indicates the results of chi-square for the Drawing Test: less than four figures in the picture vs. four or more figures in the picture.

TABLE 35

Chi-square Test for Responses on the Drawing Test (Less Than Four Figures in the Picture vs. Four or More Figures in the Picture) and Creativity Groups

		Number			
		Less 4	4 or More	Total	Percent
Creativity	Most	9	19	28	50.0
	Least	9	19	28	50.0
	Total	18	38	56	
	Percent	32.1	67.9		100.0

Chi-square = 0 Not significant

Table 36 indicates the results of chi-square for the Drawing Test: figures in the picture physically touching vs. those not touching.

TABLE 36

Chi-square Test for Responses on the Drawing Test (Figures in the Picture Physically Touching vs. Those Not Touching) and Creativity Groups

Creativity	Figures Touching	Not Touching	Total	Percent
Most	13	15	28	50.0
Least	12	16	28	50.0
Total	25	31	56	
Percent	44.6	55.4		100.0

Chi-square = 0 Not significant

Table 37 indicates the results of chi-square for the Drawing Test: a tree present vs. tree absent for the most and least creative subjects.

TABLE 37

Chi-square Test for Responses on the Drawing Test (A Tree Present vs. Tree Absent) and Creativity Groups

		Tree			
		Present	Absent	Total	Percent
Creativity	Most	24	4	28	50.0
	Least	18	10	28	50.0
	Total	42	14	56	
	Percent	75.0	25.0		100.0

Chi-square = 2.38 Not significant

Table 38 indicates the results of chi-square for the Drawing Test: one or less pieces of playground equipment vs. two or more pieces of playground equipment for the most and least creative subjects.

TABLE 38

Chi-square Test for Responses on the Drawing Test (One or Less Pieces of Playground Equipment vs. Two or More Pieces of Playground Equipment) and Creativity Groups

		Equipment			
		1 or less	2 or more	Total	Percent
Creativity	Most	26	2	28	50.0
	Least	24	4	28	50.0
Total		50	6	56	
Percent		89.3	10.7		100.0

Chi-square = 0.19 Not significant

Table 39 indicates the results of chi-square for the Drawing Test: a school building is present vs. not present for the most and least creative subjects.

TABLE 39

Chi-square Test for Responses on the Drawing Test (A School Building Is Present vs. Not Present) and Creativity Groups

		School Building			
		Present	Absent	Total	Percent
Creativity	Most	14	14	28	50.0
	Least	9	19	28	50.0
Total		23	33	56	
Percent		41.1	58.9		100.0

Chi-square = 1.18 Not significant

Hypothesis 6 concerned the relationship between the frequency of responses that have been classified on the G-J-G Test according to categories.

Table 40 indicates the results of chi-square for the G-J-G Test according to level of occupation desired by the subjects that were "most" and "least" creative.

TABLE 40

Chi-square Test for Responses on the G-J-G Test Question Number 2 According to Level of Occupation Desired by Subjects: Warner's Category 0-3 vs. 4-9 By the Most and Least Creative Groups

		Warner 0-3	Warner 4-9	Total	Percent
Creativity	Most	11	11	22	52.4
	Least	7	13	20	47.6
Total		18	24	42	
Percent		42.9	57.1		100.0

Chi-square = 0.45 Not significant

Table 41 indicates the results of chi-square for the G-J-G Test of Behavior item # My favorite subject is . . . classified according to linguistic or non-linguistic subjects expressed by the "most" and "least" creative groups.

TABLE 41

Chi-square Test for Responses on the G-J-G Test According to Favorite Subject: Linguistic vs. Non-Linguistic of the Most and Least Creative Groups

		Linguistic	Non-linguistic	Total	Percent
Creativity	Most	10	8	18	62.1
	Least	6	5	11	37.9
Total		16	13	29	
Percent		55.2	44.8		100.0

Fisher Exact (1 Tail) = 0.63 Not significant

Table 42 indicates the results of chi-square for the G-J-G Test of Behavior Item #10, I feel that most people who meet me for the first time think I am . . . classified according to socially acceptable (positive scores) or socially unacceptable (negative scores) expressed by the subjects that were "most" and "least" creative.

TABLE 42

Chi-square Test for Responses on the G-J-G Test Question #10 According to Socially Acceptable (Positive Scores) or Socially Unacceptable (Negative Scores) of the Most and Least Creative Groups

		Positive	Negative	Total	Percent
Creativity	Most	17	8	25	54.3
	Least	16	5	21	45.7
Total		33	13	46	
Percent		71.7	28.3		100.0

Chi-square = 0.08 Not significant

Table 43 indicates the results of chi-square for the G-J-G Test of Behavior Item #5, When told I did not do well on the test I . . . according to socially acceptable (positive scores) or socially unacceptable (negative scores) expressed by the subjects that were "most" and "least" creative.

TABLE 43

Chi-square Test for Responses on the G-J-G Test Question #5 According to Socially Acceptable (Positive Scores) or Socially Unacceptable (Negative Scores) of the Most and Least Creative Groups

		Positive	Negative	Total	Percent
Creativity	Most	12	14	26	53.1
	Least	6	17	23	46.9
Total		18	31	49	
Percent		36.7	63.3		100.0

Chi-square = 1.34 Not significant

Table 44 indicates the results of chi-square for the G-J-G Test of Behavior Item #34, I feel my family thinks I am . . . classified according to socially acceptable (positive scores) or socially unacceptable (negative scores) expressed by the subjects that were "most" and "least" creative.

TABLE 44

Chi-square Test for Responses on the G-J-G Test #34 Classified According to Socially Acceptable (Positive Scores) or Socially Unacceptable (Negative Scores) on the Most and Least Creative Groups

		Positive	Negative	Total	Percent
Creativity	Most	21	3	24	53.3
	Least	19	2	21	46.7
	Total	40	5	45	
	Percent	88.9	11.1		100.0

Chi-square - 0.0 Not significant

Table 45 indicates the results of chi-square for the G-J-G Test of Behavior Item #41, After I finish the test I . . . classified according to socially acceptable (positive scores) or socially unacceptable (negative scores) expressed by the subjects that were "most" and "least" creative

TABLE 45

Chi-square Test for Responses on the G-J-G Test Question #41 Classified According to Socially Acceptable (Positive Scores) or Socially Unacceptable (Negative Scores) of the Most and Least Creative Groups

Creativity	Positive	Negative	Total	Percent
Most	18	5	23	54.8
Least	15	4	19	45.2
Total	33	9	42	
Percent	78.6	21.4		100.0

Chi-square - 0.0 Not significant

Hypothesis 7 concerned the relationship between the frequency of responses that have been classified on the Parent Questionnaire according to categories.

Table 46 indicates the results of chi-square for the Parent Questionnaire concerned with fathers' educational level: high school or above completed vs. not completed according to most and least creative groups.

TABLE 46

Chi-square Test for Responses on the Parent Questionnaire Concerned with Fathers' Educational Level: High School or Above Completed vs. Not Completed, According to Most and Least Creative Groups

		Father Educ.			
		H. S. Completed	H. S. Not Completed	Total	Percent
Creativity	Most	17	11	28	51.9
	Least	18	8	26	48.1
	Total	35	19	54	
	Percent	64.8	35.2		100.0

Chi-square = 0.14 Not significant

Table 47 indicates the results of chi-square for the Parent Questionnaire concerned with mothers' educational level: high school or above completed vs. not completed according to most and least creative groups.

TABLE 47

Chi-square Test for Responses on the Parent Questionnaire Concerned with Mothers' Educational Level: High School or Above Completed vs. Not Completed, According to Most and Least Creative Groups

		Mother Educ.			
		H. S. Completed	H. S. Not Completed	Total	Percent
Creativity	Most	17	11	28	51.9
	Least	19	7	26	48.1
Total		36	18	54	
Percent		66.7	33.3		100.0

Chi-square = 0.45 Not significant

Table 48 indicates the results of chi-square for the Parent Questionnaire concerned with fathers' occupational level classified according to Warner's level 1-3 or 4-9, according to most and least creative groups.

TABLE 48

Chi-square Test for Responses on the Parent Questionnaire Concerned with Fathers' Occupational Level Classified According to Warner: 1-3 or 4-9 According to Most and Least Creative Groups

		Father Occ.			
		Warner 1-3	Warner 4-9	Total	Percent
Creativity	Most	9	19	28	50.9
	Least	9	18	27	49.1
Total		18	37	55	
Percent		32.7	67.3		100.0

Chi-square = 0.0 Not significant

Table 49 indicates the results of chi-square for the Parent Questionnaire concerned with mother working vs. mother not working, according to most and least creative groups.

TABLE 49

Chi-square Test for Responses on the Parent Questionnaire Concerned with Mother Working vs. Mother not Working According to Most and Least Creative Groups

		Mother Work			
		Yes	No	Total	Percent
Creativity	Most	8	20	28	50.9
	Least	8	19	27	49.1
	Total	16	39	55	
	Percent	29.1	70.9		100.0

Chi-square = 0.0 Not significant

Table 50 indicates the results of chi-square for the Parent Questionnaire concerned with whether the parent is satisfied with the child's career choice or not, according to most and least creative groups.

TABLE 50

Chi-square Test for Responses on the Parent Questionnaire Concerned with Parental Satisfaction vs. Dissatisfaction With Child's Career Choice According to Most and Least Creative Groups

		Parent Child			
		Yes	No	Total	Percent
Creativity	Most	14	0	14	73.7
	Least	3	2	5	26.3
Total		17	2	19	
Percent		89.5	10.5		100.0

Fisher Exact (1 Tail) = 0.06 Not significant

Table 51 indicates the results of chi-square for the Parent Questionnaire concerned with the number of children in the family: one or two; three or more; according to most and least creative groups.

TABLE 51

Chi-square Test for Responses on the Parent Questionnaire Concerned With the Number of Children in the Family: 1 or 2; 3 or More; According to Most and Least Creative Groups

		Child in Family			
		1-2	3 or more	Total	Percent
Creativity	Most	7	20	27	50.0
	Least	5	22	27	50.0
Total		12	42	54	
Percent		22.2	77.8		100.0

Chi-square = 0.11 Not significant

Table 52 indicates the results of chi-square for the Parent Questionnaire concerned with hobbies of the child: one or less vs. two or more according to most and least creative groups.

TABLE 52

Chi-square Test for Responses on the Parent Questionnaire Concerned with Hobbies of Child: 1 or Less vs. 2 or More According to Most and Least Creative Groups

		Hobbies			
		1 or Less	2 or More	Total	Percent
Creativity	Most	12	14	26	49.1
	Least	14	13	27	50.9
Total		26	27	53	
Percent		49.1	50.9		100.0

Chi-square = 0.20 Not significant

Summary for Hypotheses 5 - 7

Hypotheses 5 through 7 are summarized as a unit since all were tested using chi-square. Chi-square was used to examine the relationship of the frequency of responses on selected items of tests according to the "most" and "least" creative groups.

Hypothesis 5 concerned the frequency of responses on the Drawing Test according to selected categories in reference to "most" and "least" creativity groups. Of the 13 chi-squares there were none that were significant.

Hypothesis 6 concerned the frequency of responses on the G-J-G Test of Behavior according to selected questions in reference to "most" and "least" creativity groups. Of the six chi-squares, there were none that were significant.

Hypothesis 7 concerned the frequency of responses on the Parent Questionnaire according to selected items in reference to "most" and "least" creativity groups. Of the seven chi-squares none were significant.

Chapter 5

Summary and Implications of the Data

The 74 students enrolled in grades four through eight plus the Vocational Group at the Boston School for the Deaf, Randolph, Massachusetts, in 1966-1967, were the subjects of this study. These subjects were tested to explore creativity and each of the following variables: intelligence, school performance, imaginative productions, perception by teachers, self-evaluation career aspirations, and the subjects as members of a family group, as data on these were evidenced by instruments used in this study.

The Abbreviated Form VII, Minnesota Tests of Creative Thinking, were used as the measure of creativity. This battery includes: The Incomplete Figures Test, the Circles Task, the Product Improvement Task, and the Unusual Uses of Tin Cans Task. Scores were obtained on each subtest for fluency, flexibility, and originality, but only the combined T score was used to differentiate between the "most" and "least" creative subjects.

The 74 subjects were divided according to sex and age (those over 14 and those under 14). The highest seven scores and the lowest seven scores on the Abbreviated Form VII, Minnesota Tests of Creative Thinking were selected in each of the eight groups as the 56 subjects for further study: 28 "most" creative subjects and 28 "least" creative subjects.

The WAIS or WISC Performance Scale was used as a measure of intelligence.

School Performance was measured by the Stanford Achievement Test. Verbal achievement was measured by a mean stanine score of the Language and Paragraph Meaning Tests. Numerical achievement was measured by a mean stanine score of the Arithmetic Computations, Arithmetic Concepts, and Arithmetic Applications tests. Although the tests were not the same as those used by Getzels and Jackson (1962) the Verbal and Numerical areas tested were the same.

Imaginative productions were measured by the Drawing Test used by Getzels and Jackson (1962) according to the same categories. Other categories were added by the investigator to further describe the "most" and "least" creative subjects.

Perception by teachers was measured by a Teacher Rating described and used by Getzels and Jackson (1962). The investigator added a creativity category to Getzels' and Jackson's classification.

Career aspirations were measured by scores on selected items on the G-J-G Verbal Thinking Speed Test. The level of career aspiration was considered in relation to the classification developed by Warner (1960). The favorite subject selected by the student was categorized according to linguistic or non-linguistic emphasis.

Self-evaluation was measured according to the mean score of the groups on the G-J-G Verbal Thinking Speed Test and the G-J-G Test of Behavior. The socially acceptable responses were scored positive, and the socially unacceptable scores were termed negative. Selected items were scored individually on the G-J-G Test of Behavior to further describe the "most" and "least" creative groups.

The subjects were described as members of a family group on selected items of the Parent Questionnaire used by Getzels and Jackson (1962). Other categories were added to yield information applicable to subjects with hearing difficulties. The categories included: educational level of parents, the father's occupational level according to Warner (1960), whether or not the mother worked outside the home, the parental satisfaction with career choice of child, the number of children in the family, and the child's number of hobbies.

The data for the eight groups of subjects were analyzed by the analysis of variance, three way classification, to determine significant differences in the means of the "most" and "least" creative groups grouped by age and sex on intelligence and achievement tests, the Teacher Rating and the G-J-G sentence completion tests. The .05 level of probability was accepted as a basis for rejecting the null hypothesis. When the null hypothesis was rejected at the .05 level of probability, the individual groups were analyzed by t tests. The .05 level of probability was again accepted as a basis for rejecting the null hypothesis.

The frequency of responses for the 28 "most" creative and the 28 "least" creative subjects on the Drawing Test, selected items on the G-J-G Test of Behavior and the Parent Questionnaire were analyzed by the chi-square test of independence. The .05 level of probability was accepted as a basis for rejecting the null hypothesis.

The Drawing Test was scored by two other scorers for 20 of the 58 tests. Scorer reliability was indicated for the 13 categories by percentage of scorer agreement.

The G-J-G Verbal Thinking Speed Test and the G-J-G Test of Behavior were also scored by two other scorers for 20 of the 58 tests. Scorer reliability was indicated by a correlation coefficient.

Disposition of the Hypotheses

The first hypothesis, that there is no significant difference between the means on the WISC or WAIS for "most" and "least" creativity groups for boys and girls under 14 and over 14 was rejected. F values for the difference between means when grouped by sex was significant beyond the .05 level of probability. The interaction between sex and creativity was significant beyond the .01 level of probability.

The t tests indicated a significant difference in IQ mean scores: males under 14 high creativity had a higher mean score than the females under 14 high creativity (.01 level of probability); males under 14 high creativity had a higher mean score than the females over 14 high creativity (.05 level of probability); males under 14 high creativity had a higher mean score than the females over 14 low creativity (.05 level of probability); males under 14 high creativity had a higher mean score than the males over 14 low creativity (.05 level of probability).

One analysis of variance, three-way classification, and t tests were used to test Hypothesis One.

The second hypothesis: that there is no significant difference between the means on the Stanford Achievement Test for "most" and "least" creativity groups for boys and girls under 14 and over 14 was accepted for the means considered in relation to Verbal achievement. When the means were considered in relation to Numerical achievement F values were significant beyond the .05 level of probability among age groups, and there was significant interaction beyond the .05 level of probability between sex and age, sex and creativity, and age and creativity.

The t tests indicated a significant difference in numerical achievement: females over 14 low creativity had a higher mean score than females under 14 high creativity (.001 level of probability); males under 14 high creativity had a higher mean score than females under 14 high creativity (.01 level of probability); males over 14 high creativity had a higher mean score than females under 14 high creativity (.04 level of probability); females over 14 low creativity had a higher mean score than females under 14 low creativity (.001 level of probability); males under 14 high creativity had a higher mean score than females under 14 low creativity (.01 level of probability); males over 14 high creativity had a higher mean score than females under 14 low creativity (.03 level of probability); females over 14 low creativity had a higher mean score than males under 14 low creativity (.001 level of probability); and males under 14 high creativity had a higher mean score than males under 14 low creativity (.01 level of probability).

Two analyses of variance, three way classification and t tests were used to test Hypothesis Two.

The third hypothesis: that there is no significant difference between the means on the Teacher Rating for "most" and "least" creativity groups for boys and girls under 14 and over 14 was rejected for desirability as a student and accepted for: the ability of the student to become involved in learning activities, leadership ability, and creativity.

When the means were considered in relation to desirability as a student, the F values were significant beyond the .05 level of probability when considering the interaction of sex and creativity.

The t tests indicated a significant difference in desirability as a student: females under 14 low creativity had a higher mean score than males under 14 low creativity (.05 level of probability);the males under 14 high creativity had a higher mean score than males under 14 low creativity (.05 level of probability).

Four analyses of variance, three way classification and t tests were used to test Hypothesis Three.

The fourth hypothesis: that there is no significant difference between the means on the G-J-G Tests for "most" and "least" creativity groups for boys and girls under 14 and over 14 was rejected. F values for differences between means was significant among age groups beyond the .05 level of probability. The _t_ tests indicated a significant difference on the G-J-G Verbal Thinking Speed Test: females under 14 high creativity had a higher mean score than males over 14 low creativity (.03 level of probability). The _t_ tests indicated a significant difference on the G-J-G Test of Behavior: females under 14 high creativity had a higher mean score than males over 14 low creativity (.04 level of probability); females under 14 low creativity had a higher mean score than males over 14 low creativity (.05 level of probability); males under 14 high creativity had a higher mean score than males over 14 low creativity (.04 level of probability).

Two analyses of variance, three-way classification and _t_ tests were used to test Hypothesis Four.

The fifth hypothesis: that the frequency of responses on the Drawing Test on 13 categories are independent of the categories "most" or "least" creative was accepted for all categories.

Thirteen chi-square analyses were used to test Hypothesis Five.

The sixth hypothesis: that the frequency of responses on the G-J-G Test of Behavior on six selected items were independent of the categories "most" and "least" creative was accepted for all items.

Six chi-square analyses were used to test Hypothesis Six.

The seventh hypothesis: that the frequency of responses on selected items on the Parent Questionnaire are independent of the categories "most" or "least" creative was accepted for seven items.

Seven chi-square analyses were used to test Hypothesis Seven.

Implications - Hypotheses 1-7

Hypothesis 1

Since Guilford's (1950) prediction that the relationship between intelligence and creativity would be low, there has been controversy concerning the relationship. Indications in this study were that the intelligence test scores did not differentiate between the "most" and "least" creative students except in the area of boys under 14.

Hypothesis 2

Indications in this study were that Verbal achievement scores did not differentiate between creativity groups. This study would support Edwards and Tyler's (1965) and Hasan and Butcher's (1962) findings.

However, in the area of Numerical achievement, there were differences among age groups and interactions between age, sex, and creativity. Giangreco (1966) stated that the Numerical areas indicated the highest and most consistent correlation throughout the entire sample of 235 deaf subjects. Low correlations appeared in subjects requiring reading skill.

This finding would tend to make the results in this study more meaningful in reference to Numerical achievement.

Hypothesis 3

Indications in this study were that boys and girls in the low creativity group differ in preference by the teacher: the teacher preferred the girls. There were also differences between the boys under 14 in that the teacher expressed preference for the high creative boys rather than the low creative boys.

The indication that with deaf subjects the Teacher Rating differentiates between the creativity groups for boys in the direction of approval for the high creative group differs from the lack of approval found by investigators with creative hearing subjects. (Getzels and Jackson 1962) (Hasan 1965).

The Teacher Rating did not differentiate among creative groups in reference to ability to become involved in learning activities, leadership ability, or creativity.

Hypothesis 4

Indications in this study were that scores on the G-J-G Tests did not differentiate between creativity groups but did differ for those over 14 and those under 14. The subjects under 14 attained higher mean scores than those over 14. These findings should take into consideration the problems that the younger students in general had in taking these tests lending greater credence to the finding that those under 14 indicated a greater number of positive or socially acceptable scores than the older subjects.

Hypothesis 5

In the categories selected by Getzels and Jackson (1962), there was a high degree of humor, more stimulus free drawings, and a greater amount of violence for the high creatives. This study indicated no significant difference between the responses of the high creatives and the low creatives.

The fact that the Drawing Test did not differentiate between deaf subjects as it has for hearing subjects might be related to the general controversy concerning the imaginative productions of deaf subjects: whether the deaf may be underdeveloped in concept formation or possess a different system of concept formation than hearing subjects.

Hypothesis 6

The indications of this study were that the "most" creative and "least" creative groups could not be differentiated according to socially acceptable responses as measured by the G-J-G Test of Behavior. Getzels and Jackson (1962) suggest that the high creatives would have a greater number of negative or unconventional responses.

Hypothesis 7

Indications in this study were that the Parent Questionnaire did not differentiate between creativity groups for deaf subjects. In reference to career aspirations, the investigators with hearing subjects have indicated a preference for unconventional occupations. (Getzels and Jackson 1962) (Torrance

1965) (Dauw 1965). Perhaps the lack of differentiation with deaf subjects is due to the limited and unimaginative vocational choices expressed by deaf subjects in general (Myklebust 1960). Lunde and Bigman (1959) suggest that the vocational choices of deaf subjects may reflect an unconscious awareness that opportunities are limited.

No differences were found in parents' educational level for parents of high or low creative deaf children, nor were differences found between these two groups when the mother worked outside of the home. However, with hearing subjects, the parents of high creatives have been differentiated by educational level in that the parents of high creative children had a higher educational level.

Significance

The nature of this study was exploratory, so that the findings were not definitive but rather indicative of areas for further study. No previous study with deaf subjects has concerned creativity and the variables selected for this study.

This investigation has not been able to differentiate between the "most" creative or "least" creative student at The Boston School for the Deaf. However, there were indications that there were sex differences in mean scores on an intelligence test.

There were indications that in reference to means in Numerical achievement tests, there were interactions between age, sex and creativity.

There were indications of teacher preference for girls who are low in creativity to be preferred to boys who are low in creativity in reference to desirability as a student; and for boys who are high in creativity to be preferred to boys with low creativity.

There were indications that deaf subjects under 14 have higher positive scores on the G-J-G Test of Behavior than those who are over 14.

The high creatives could not be distinguished from the low creatives in reference to the Drawing Test.

The high creatives could not be differentiated from the low creatives on selected items of the G-J-G test.

The high creatives could not be differentiated from the low creatives as members of a family group.

These indications were not conclusions but areas that need to be investigated by further research.

Further Research

1. What would the results be if this study were replicated in a different school for the deaf (not taught by parochial educators) in a different area, with children of the same age group and repeated with children of different age groups?
2. What would the results be if Madaus' design (1967) were replicated with deaf subjects? Madaus (1967) indicated that the intercorrelations between selected subtests of the Minnesota Tests of Creative Thinking and the School and College Ability Test for 603 high school sophomores showed

the Minnesota Tests of Creative Thinking to be independent of intelligence as measured by the SCAT. Would the Torrance Tests of Creative Thinking again be found to be independent of intelligence?

3. If the "most" and "least" creative group continued to be differentiated on the Torrance Tests of Creative Thinking and independent of intelligence and achievement, what would the educational methods be that would develop this "creativity", and what measures would be employed to develop creative potential in the "least" creative group?
4. There is no doubt that it is difficult to test large groups of deaf subjects but only if longitudinal studies are undertaken and systematic procedures employed will it be possible to discuss the results of research realistically.

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APPENDIX A

The G-J-G Verbal Thinking Speed Test

For the use of Schools, Colleges, and Records Offices

Name________________________ Age ____________________

Date ____________________

DO NOT TURN THIS PAGE
UNTIL YOU ARE TOLD TO BEGIN
DO NOT SKIP ANY SENTENCES

1. When Frank has nothing to do, he ____________________
2. When Stan grows up he wants to become a(n)____________________
3. When Jim has something to say and others are around, he ____________________
4. Other people think that Hugh is ____________________
5. When told that he failed the test, Gene ____________________
6. Bill's family ____________________
7. Henry thinks a person is good who ____________________
8. Whenever Sister gives a test Dave ____________________
9. If the choice of what he would do for work when he is big were Ken's, he would be ____________________
10. Floyd feels that most people who meet him for the first time think he is ____________________
11. When they asked Al to be the teacher, he ____________________
12. Above all, Joe wishes his father were ____________________
13. After finishing school, Hal ____________________

14. Lou feels there is nothing worse than ____________________

15. Walter knows that Sister thinks he is ____________________

16. When Harold is teacher he feels ____________________

17. In Bert's class he feels himself to be ____________________

____

18. Tom's mother ____________________________________

19. When Fred tells about work that might make him happy, he

says ____

20. The reason Stan might give up trying is ____________________

21. Working with others all the time makes Henry ____________

____

22. Jerry thinks he is best at ____________________________

23. Nick's opinion of most teachers is that ____________________

____

24. When they say Dick is like his mother, he feels ____________

____

25. The work that Ben likes to do is ____________________________

26. If Phil could have three wishes, he would ____________________

____

27. When Roy sees others doing better than he is, he ____________

____

28. Steve believes most grown-ups think of him as being ________

____

29. If Leo could begin all over again, he ____________________

____

30. If his father could change, Bob would want him to be ____

____

31. Pete would like to be ________________

32. The thing that Ken feels sad about is ________________

33. When Ed thinks that he will not do well he ________________

____

34. Ted feels his family thinks he is ________________

35. Earl feels happiest when ________________

36. Above all, Joe wishes his mother was ________________

37. Lee feels most people are ________________

____

38. The thing that makes Al study hardest is ________________

39. Ten years from now, Mike wants to be ________________

40. Charles himself knows that he ________________

41. After Paul finishes a test, he thinks that he ________________

____

42. Tom's father ________________

43. Jack always wanted to be a (n) ________________

44. Don thinks most people work because they ________________

____

45. Ralph often thinks of himself as ________________

46. When George tries to do the lesson and can't, he ________________

____

47. The reason Mort tries to do well is ________________

____

48. Hal sometimes thinks his family is ____________________

____

49. Alan's favorite subject is ____________________

50. If there is one thing that might make Steve stop a job, it is ____________________

51. Carl thinks most people think of him as ____________________

____

52. When Harry is told he will have to do a paper by himself, he ____________________

53. If John could do one thing during his lifetime, he would want it to be ____________________

54. If his mother could change, Bob would want her to be ____

____

55. Herb often feels that school ____________________

____

56. When Dan thinks the work is too much for him, he ________

____

57. Ben thinks a bad thing about himself is ____________________

____

58. Ray feels that he would like to be ____________________

____

59. When they say Dick is like his father, he ____________________

____

60. When Pete is asked what he really would like to do best, he says ____________________

APPENDIX B

The G-J-G Test of Behavior

For the use of Schools, Colleges, and Records Offices

Name ______________________ Age __________ Grade _____

Date ____________________

DO NOT TURN THIS PAGE
UNTIL YOU ARE TOLD TO BEGIN
DO NOT SKIP ANY SENTENCES

1. When I have nothing to do, I ________________________
2. When I grow up I want to become a(n) ____________________
3. When I have something to say and others are around, I ____ ____
4. Other people think that I am ______________________
5. When told that I did not do well in the test, I ____________ ____
6. My family ______________________________________
7. I think a person is good who ______________________
8. Whenever Sister gives a test I feel __________________ ____
9. If the choice of what I would do for work when I am big were mine, I would be ______________________________
10. I feel that most people who meet me for the first time think I am ____
11. When they asked me to be the teacher, I ______________ ____
12. Above all, I wish my father were ____________________

13. After finishing school, I ______________________________

14. I feel there is nothing worse than ______________________________

____

15. I know that Sister thinks I am ______________________________

16. When I am teacher I feel ______________________________

____

17. In my class I feel myself to be ______________________________

____

18. My mother ______________________________

19. When I tell about work that might make me happy I say ________

____

20. The reason I might give up trying is ______________________________

21. Working with others all the time makes me ______________________________

____

22. I think I am best at ______________________________

23. My opinion of most teachers is that ______________________________

____

24. When they say I am like my mother, I feel ______________________________

____

25. The work that I like to do is ______________________________

____

26. If I could have three wishes, I would ______________________________

____

27. When I see others doing better than I am, I ______________________________

____

28. I believe most grown-ups think of me as being ______________

29. If I could begin all over again, I ______________

30. If my father could change, I would want him to be ______________

31. I would like to be ______________

32. The thing that I feel sad about is ______________

33. When I think I will not do well I ______________

34. I feel my family thinks I am ______________

35. I feel happiest when ______________

36. Above all, I wish my mother were ______________

37. I feel most people are ______________

38. The thing that makes me study hardest is ______________

39. Ten years from now, I want to be ______________

40. I myself know that I ______________

41. After I finish a test, I think that I ______________

42. My father ______________

43. I always wanted to be a(n) ______________

44. I think most people work because they ______________

45. I often think of myself as ______________________

46. When I try to do the lesson and can't, I ______________________

47. The reason I try to do well is ______________________

48. I sometimes think my family is ______________________

____

49. My favorite subject is ______________________

50. If there is one thing that might make me stop a job, it is

____

51. I think most people think of me as ______________________

52. When told I have to do a paper by myself, I ______________________

____

53. If I could do one thing during my lifetime, I would want it to be ______________________

54. If my mother could change, I would want her to be ______________________

____

55. I often feel that school ______________________

____

56. When I think the work is too much for me, I ______________________

____

57. I think a bad thing about myself is ______________________

____

58. I feel that I would like to be ______________________

____

59. When they say I am like my father, I ______________________

____

60. When I am asked what I really would like to do best, I say

____

APPENDIX C

Scoring Key For G-J-G Tests

Item:	Neutral	Positive	Negative
1	go out wash dishes wash clothes		
2	teacher scientist hairdresser		
3		listens says "hello" thinks of how to say something	was sad was shy was afraid
4		smart nice happy a good boy/girl	sad mad shy bad
5		try harder work study	was angry was sad cried
6	go to visit went to Boston	was happy was nice	was sad was angry
7		is smart is nice is beautiful	is mad is angry
8		tries thinks works	is scared is unhappy cries
9	a job	good a teacher drive a car	nothing a coward

Item:	Neutral	Positive	Negative
10.		happy good grown-up	nervous shy upset
11.		thinks tries does it	says no doesn't do it
12.		boss famous	moved changed not mad
13.		was happy worked	did nothing stayed home
14.		being sad being lazy	being happy hearing
15.		smart tries a good boy	selfish a bad boy/girl gets low marks
16.		happy good proud	sad shy afraid
17.		happy good	sad nervous ashamed
18.	shops cooks works	is wonderful is good	yells at me
19.		wonderful happy	fails says nothing
20.		proud	bashful mad tired

Item:	Neutral	Positive	Negative
21.		happy glad	sad afraid
22.		school work football	nothing
23.		good fine	don't help bad
24.		happy delighted	angry don't like it
25.		study school	nothing
26.		do what I want a pool money	nothing
27.		tries harder works	is angry jealous
28.		nice fine good	bad tired upset
29.		learn work try hard	stay home nothing
30.		famous	a bum
31.		a teacher nurse	nothing stay home
32.		is sick	is sorry
33.		works tries	is sad cries
34.		good fine happy	bad fresh

Item:	Neutral	Positive	Negative
35.		works gets praise	unhappy sad
36.		is good is fine	friendly happy
37.		nice good	foolish
38.		college history	nothing
39.		a doctor famous	crazy nothing
40.		good smart nice	sad foolish
41.		was good did well	failed
42.		is good helps	is bad is angry
43.		a help	nothing
44.		a good boy/girl want money	are tired
45.		love God handsome	afraid
46.		grown-up tries again works harder	stupid gives up stops work
47.		good work parents happy	no work does not try
48.		good happy	angry sad
49.		history science	nothing no school

Item:	Neutral	Positive	Negative
50.		try harder work	tired too hard
51.		good happy	shy stupid
52.		tries works	cries is sad
53.		good	nothing
54.		not change fine	happy friendly
55.		is good is fun	is too hard is bad
56.		works hard tries	stops is sad
57.		is cross is sad	
58.		a teacher nurse	nothing stay home
59.		is happy likes father	is sad
60.		go to college work be scientist	nothing no work

APPENDIX D

Teacher Rating

Name ______________________

Item I	Low	High
(general desirability as a student)	1 2 3 4 5	
Item II		
(leadership qualities)	1 2 3 4 5	
Item III		
(ability to become involved in learning activities)	1 2 3 4 5	
Item IV		
(is this child creative?)	1 2 3 4 5	

Signature:

____

APPENDIX E

Supplementary Information Sheet

Name of Student ____

Birthplace of Father ________________ Date of Birth ____________
Month Year

Birthplace of Mother ________________ Date of Birth ____________
Month Year

Age of parents when married: Father _____ ; Mother ___________

With whom is the student now living? (Check one)

- ☐ Mother and Father
- ☐ Mother and Stepfather
- ☐ Father and Stepmother
- ☐ Mother only
- ☐ Father only
- ☐ Foster parents
- ☐ Relatives
- ☐ Other (specify)________

If the student is not now living with both his natural parents:

How old was the student when separation took place?

Under what circumstances did the separation take place? (Check one)

- ☐ Divorce of parents
- ☐ Legal separation
- ☐ Death of one parent
- ☐ Other (specify)________

Number of children in the family ____________________

What is the birth order of the student in the family? (Check one)

- ☐ Only child
- ☐ Oldest child
- ☐ Youngest child
- ☐ Has both older and younger brothers and/or sisters

Father's Occupation: (Please be specific, e.g. Associate Professor of Mathematics; retail store proprietor; lathe operator; salesman of commercial insurance, etc.)

____

Mother's Occupation: (If employed outside of home, please give job description and number of hours per week).

____

Father's occupation at time of student's birth: __________________

Education of parents: (Please circle highest grade completed).

Father: Grade 1 2 3 4 5 6 7 8, High School 1 2 3 4
College 1 2 3 4; Post-graduate 1 2 3 4 +
Highest degree held: ____________________

Mother: Grade 1 2 3 4 5 6 7 8; High School 1 2 3 4
College 1 2 3 4; Post-graduate 1 2 3 4 +
Highest degree held: ____________________

How many times has the student had to change schools because the family moved its place of residence?

____

Has the pupil expressed interest in a particular career? Yes___No___

If yes, specify: ________________________________

From your observation, how good a choice do you think this is for him?
( )Very good choice ( ) Moderately poor choice
( ) Good choice ( ) Poor choice

In terms of your present knowledge of your child's aptitudes and interests, what career lines would you think appropriate for him?

____

____

Does your child have any hobbies?

Does your child like any sport?

What is your child's favorite T.V. show?

Does your child find visiting museums etc. interesting?

If yes, what is your child most interested in?

Does your child enjoy playing with others his own age?

Does your child enjoy playing with younger children __________
older children __________

Dear Parents:

The above questionnaire is a part of a study being made at our school under a Federal Grant. May we ask you to complete this information as soon as possible and sign the form below. Please return it to the school. Thank you for your cooperation.

The above information may be used for this special study.

Father's signature ________________

Mother's signature ________________